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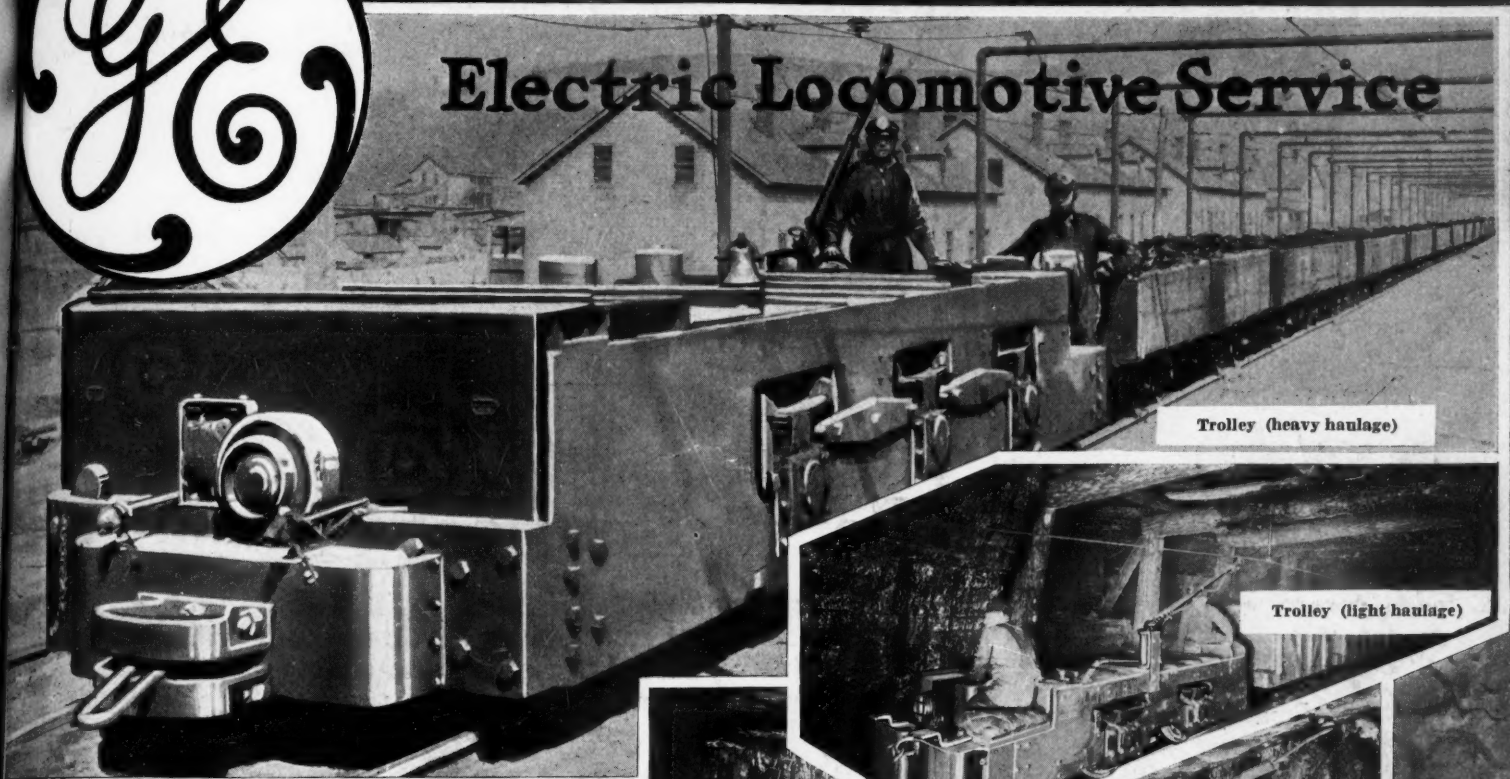
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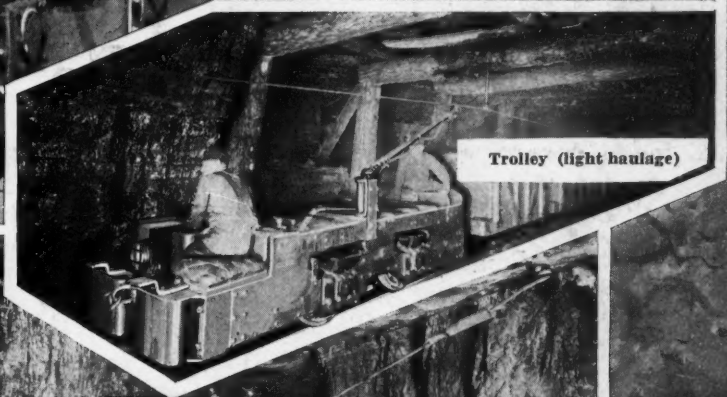
June 21, 1923



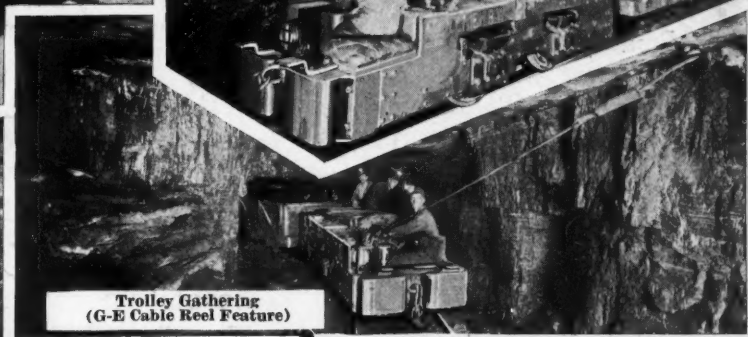
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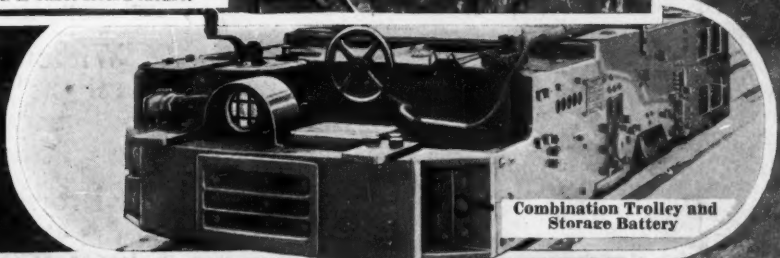
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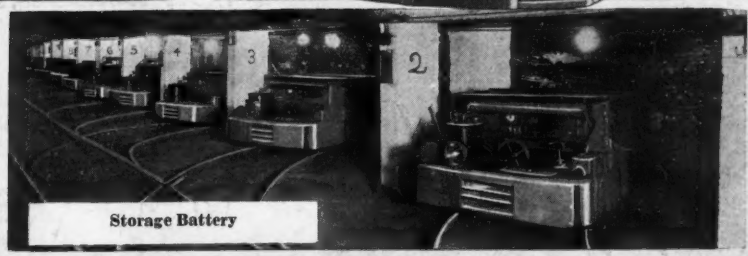
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COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER, Editor

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Day Versus Tonnage Wage

AT A meeting of the Illinois Mining Institute the use of loading machines was vigorously discussed. It appears that the introduction of mechanical loaders in the Middle West, as elsewhere, is well on its way. John Garcia declared that mining practice will have to be made to conform to the machine, for the machine cannot be made to meet present loading conditions satisfactorily.

Its introduction, however, depends just as much on so adapting haulage conditions to the needs of the machine that there will be no delays. Expensive machines should not be held waiting for uncertain deliveries of cars. The operator must be prepared to keep the cars in constant supply. If he pays his men by their tonnage he has every reason to be slack in delivering cars, for prompt service is expensive. Only when the operator gets a profit from such service will he be induced to afford it. Till then he must put his interest in transportation first and his interest in the mining and loading of coal second.

If the railroads of the country owned the coal mines or the mines the railroads, the operator would get his gondolas on time every morning. The railroads would be run so that there would be no uncertainty as to this, for a steady run and a full day would be necessary if a maximum profit was to be assured. In consequence of the divorce between these elements in coal handling the railroad finds it profitable to run the business with a callous indifference to mine operation. In fact only by regarding transportation as a business in itself to be run on the most economical basis regardless of the needs of the coal mines can a profit be made from railroading.

Likewise, the mine operator with his day men runs his underground and, where he has it, his surface transportation as an end in itself. The loader can load only when he has cars. He is interested therefore in receiving car service; the operator is concerned only with the cost of transporting cars to the face, and he puts that first and service second. It is the only way to make a living. Interest him by allowing him to operate his mechanical loaders by day-wage employees and he will co-ordinate loading and transportation. He will be willing to haul wastefully to make the savings in loading that can come only by prompt and regular car service.

Today the operator no longer runs his whole mine. He has sub-contracted the mining and loading part of it. Haulage he keeps in his own hands. As sure as day follows night, the operator must run his transportation plant economically and from purely a transportation angle, which is not economical from the point of view of mining and loading. Co-ordinated interest is the only hope for co-ordinated industry. There can be no common interest where part of the business makes profit for one man and the other part makes it for another.

Realizing this and also that the speed of the machine is based on its capacity and not on the energy of its operatives and that therefore there is no longer need to hold out an incentive to them, the operator is disposed to pay his men by the day for loading, and in this his decision is good. So long as he thus pays his men he will run his transportation to suit both of his interests—his old interest in cheap haulage and his new interest, that of low-cost coal production at the face.

No one can doubt that a thoroughly mechanized mine should be on the day basis. The stationary engineer is not paid by the horsepower generated but by the hours on the job. The engine is regulated and the pressure of the steam is adjusted to provide a certain power, and though skill might be encouraged by a scale of payment rated on the power produced, as there is no labor involved, payment advisedly is made by the day and not by the kilowatt or horsepower.

In the running of a loader one man may need to be skilled and may have to use judgment to keep up the flow of cars to the machine, but there is no more need to pay him on the tonnage basis than the foreman, and as for the other men, they provide little labor and less skill. They merely remain on the job watching the machine do the work, always closely under the supervision of the boss loader and higher officials. Where, as in Orient No. 2 mine in Illinois, four machines can load out 500 tons, the work of supervision is greatly reduced and can be thoroughly performed. The work is concentrated and every item of management accordingly is simplified. No longer will mining be a work of seclusion; no longer will it pay its men on a basis of performance, for supervision will be the guarantee for faithfulness and the ease with which the work is performed will make shirking of no advantage to the indolent.

Can't Eat Your Cake and Have It Too

WHEN rates on coal were increased in 1920 the Interstate Commerce Commission ordered that differentials between competing fields be preserved. Thus when the 40-per cent increase was put into effect the amount in cents per ton was determined for one group and applied to all others meeting in the same market. As between Ohio and the so-called inner and outer crescent groups of West Virginia shipping coal into Michigan the 40-per cent increase was applied to the inner crescent and the 81c. as to Detroit on coal from Kanawha became 86 per cent on coal from Pocahontas and 50 per cent on coal from Ohio. To this the Ohio shippers, particularly those in southern Ohio, have taken serious exception, saying that no longer does the dollar buy as much transportation on Ohio coal as on that from West Virginia. The railroads originating West Virginia coal have given scant consideration to Ohio's plaint.

They have recently come to a realization, however, that they cannot eat their cake and have it too. The

advantage, by comparison, of a lower freight rate has aided their shippers, but the gain has not all been velvet. These carriers, too, notably the C. & O. and the N. & W., do not deliver coal to Michigan destinations, some 6,000,000 tons of which they originate each year. They must divide with destination roads as the P. M. and the Ann Arbor. It is on this division that the tale hangs.

The split has always been on a flat percentage basis, the originating carrier taking some 52 per cent of the base rate on Ohio coal. Thus when the rate on Pocahontas coal to Bay City, an average point, was increased from \$2.80 to \$3.84, or \$1.04, the originating carrier got but \$2.39 as its share, which is nearly 11c. less than the proportion formerly going to the roads south of Toledo. It has been estimated that the Southern roads thus lost nearly a million dollars per year, which the Michigan roads received, of course.

The Southern roads are asking the I. C. C. to allow them to retain as their share the same percentage not of the Ohio rate as advanced 50 per cent but as it would be if it had been advanced 40 per cent and not so many cents per ton. Ohio coal shippers are watching the outcome with pleased interest.

What Makes a College?

MANY of our big colleges are grievously overrated because they are classed solely on the quality of their product. Without attempting in any way to deny the superiority of their faculties and facilities, it seems only fair to point out that they receive good material and from it they naturally make a good fabric. Their final product is good because they start with goods of excellent quality. If to your school or college you can draw the sons of distinguished successful men you are more likely to deliver a product that will, at least, have the ability to succeed in business and in the world than if you admit men who are impelled to take up the curriculum solely because they delight in study and have a flair for learning. It is because of the quality of the men attending Yale, Harvard and Princeton, Oxford and Cambridge that these universities have such a wonderful hold on our imagination.

They draw men of character and intelligence, men who go to college only because in their station of life it is the right course to pursue. If they learn only a little, if they gain only a half of what your real night-oil student learns, it is of advantage in their after life; the quality of their character and the brightness of their intelligence will do the rest. They are quite usually not naturally students. They attend college for the companionship and the sports, because tradition has said that it is not yet time for them to dig for a living, but they have the right qualities of mind, and the education they get rounds out what they already have. In all this, however, it must not be forgotten that many sons of unsuccessful fathers nevertheless have qualities that in a sense almost predestine them to financial success or to distinction. They are, however, quite exceptional.

To those not surrounded by tradition of college attendance, who rather loathe study, we would say as forcefully as language permits, Go to college. If you have neither character nor mental brilliance, education will serve to find you a definite if not an extremely lofty place in life. If you have both and loathe study, college

will give you what you will never get without it. Education is not of as much value as what you have, but it will be of inestimable value in giving you what you lack.

The wholly scholastic trend of the "plug-hard" college is perhaps to be regretted. It drives away the man whose genius is companionship, originality, intellectualism. The Gradgrind parasite who lives on other people's thoughts will never be a leader in the world no matter how many "ologies" he masters. The man who will make those "ologies" yield their power will be the man of active mind who does not live for them but makes them live for him.

What we would have the young man who does not want to go to college realize is that he is the man that needs a collegiate education and that it is just such a man that the colleges need. No curricula on management, cost accounting, history or debating will make a leader and vice-president out of a follower. Given, however, a man of leadership, a vital, inspiring, healthful, brilliant man, no matter from what origin drawn, and education will give him tools for his hand, methods for his operations, plans for his future. College for him will not come amiss. If it were not for the college campus, the river to row on, the college papers, the debating society and the glee club one may well wonder if the life at the university would appeal to any men of broad executive ability whose genius is in action rather than in study.

After all, success in business and in world affairs is only one kind of success. The lesser colleges do translate from school to lifework a wonderful quota of men of intellect, whose work in research advances the progress of the world. But the average college, especially in America, has today a somewhat different aim. Perhaps it is a little unwilling to acknowledge it, but the fact remains that it seeks to graduate men for successful business and is not satisfied unless it does, and it largely weighs itself in that balance. Moreover, the man who considers the question of going to college or of sending his sons there weighs the institution in the same way. It is not a very worthy measure, but so long as it is used for the appraisal of merit colleges must seek to attract to their halls men having the characteristics of financial success if they would graduate men whose careers will bring great business profit.

If you want to install a motor having certain characteristics you must choose one that has them. That may not be the best of motors but it is the one you are needing, and so long as you need it do not complain if a motor of other characteristics picked up at random will not give you what you want. It is so easy to recognize that all motors—series, shunt, induction, synchronous, repulsion—are not the same, but how hard it is to hold the same of men when we have tried so doggedly and so long to believe that with favorable circumstances, proper environment and intensive education we can make a man of parts and of business ability out of anyone. The ultimate redemption of the unfit by education is a pious hope that none of us can give up without a struggle.

ANOTHER EXPLANATION is that the people's representatives have no definite instructions, while the lobbyists have.—*Marion Star*.

IT IS WELL TO REMEMBER that Adam's fall came before and not after he learned to sweat for a living.—*Rochester Times-Union*.

Anthracite Workings in Western Middle Field Are 148 Per Cent Deeper Than in 1872*

Operations in That District's Seventeen Seams Grow More Difficult as Old Workings Are Reopened to Extract Coal Spurned in Early Days—Costs Steadily Mount

By D. C. ASHMEAD
Kingston, Pa.

A HALF century of mining Pennsylvania anthracite in the Western Middle field—a narrow territory extending from a point east of Mahanoy City westward through Shamokin to Trevorton—has proved the well-known facts that anthracite workings are growing swiftly deeper and thinner, that output per miner is growing steadily less and that the introduction of modern methods and machinery in haulage, ventilation and hoisting is reducing the number of the inside company men while greater care in coal preparation is increasing the number of men working outside.

The depth of the seventeen beds in the Western Middle field has increased no less than 148 per cent from 224 ft. in 1872 to 555 ft. in 1921 and difficulties of extraction are great not only because of this but because it is now necessary to reopen old and badly caved workings to extract coal that was left by hasty methods in effect prior to 1907. The decrease in production per man since 1872 in this district, however, is only 9.1 per cent, which is the smallest drop to be noted in any district described in this series of articles.

Data are available for more collieries in this district than in any other district described in this series. A large number of collieries in the early periods of the last century operated only a short time and then were abandoned. Evidently they mined only the cream of the coal. The large number of collieries in the early days is well brought out in the diagram in Fig. 62. In 1872 there were at least 127 collieries reported, and as the records are a little uncertain in this district in the first three periods, probably a great many more operated than are shown in this diagram. From 1872 to 1921 there is a steadily decreasing number of collieries, due to abandonment and consolidation.

In the period between 1877 and 1882 the proportion of the collieries used in the tonnage calculations is less than that of any other period. This is because a number of the collieries were so small and their data so incomplete that the available information was worthless.

From 1882 the proportion of the collieries whose data was of value is greater and as a result the tonnage curves show nothing surprising. Even in the first two periods the number of unreported collieries in proportion to the total number having complete information is so small as to have little effect on the curves, for the reasons previously set forth.

Unfortunately it was not possible to obtain from the larger companies much information regarding the thickness of the beds and the depth of the working. Therefore the depth and thickness curves give only an indication of what has happened in this region and are

TABLE I.—NUMBER OF COLLIERIES IN WESTERN MIDDLE FIELD

	Total as Reported by Department of Mines	Having Depth and Thickness Data	Having Tonnage Data
1872	127	12	78
1877	110	12	81
1882	101	12	66
1887	84	15	67
1892	80	13	61
1897	71	14	60
1902	66	15	55
1907	65	16	55
1912	63	15	55
1917	61	16	54
1921-2	59	16	

not at all conclusive. Only sixteen collieries in any one year furnished the data requested.

In this region the geological conditions show a marked variation from those of previously described districts. Here there are the same steep pitches that are found in the Panther Creek district and in the Eastern Middle field, but instead of the basins being V-shaped, as in these fields, the bottoms are broad and flattened out as shown in Fig. 63, which is a general cross-section of the region. This makes the section look

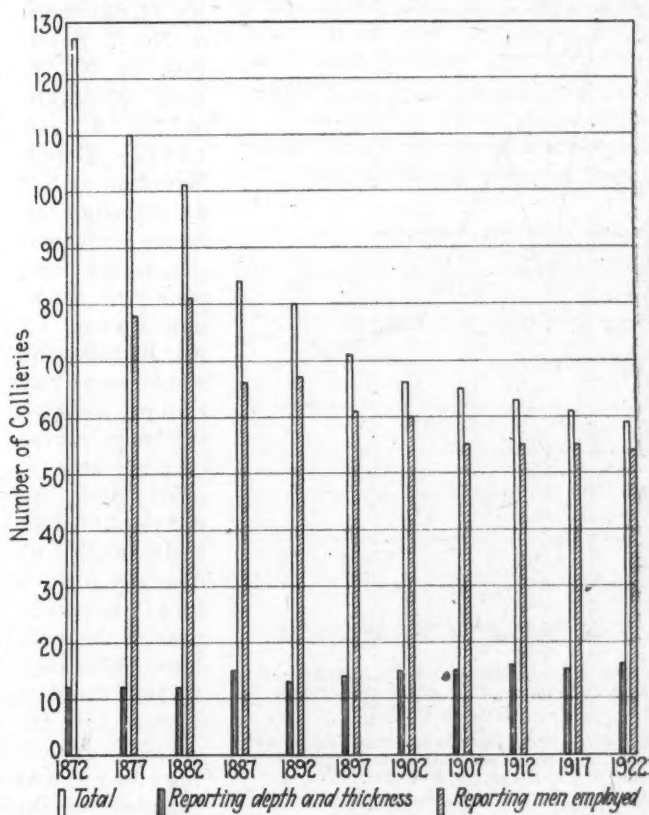


FIG. 62.—NUMBER OF COLLIERIES IN THE WESTERN MIDDLE FIELD

This diagram shows the number from which statistics on depth and thickness of coal mined were available, and from which data was secured on men employed and tonnage produced, as compared with the total.

*This is the sixth in a series of articles by Mr. Ashmead describing conditions in the seven sections of the Pennsylvania anthracite region. Previous articles appeared in *Coal Age* for Feb. 22, March 22, April 5, May 10 and May 31. The seventh will appear soon.

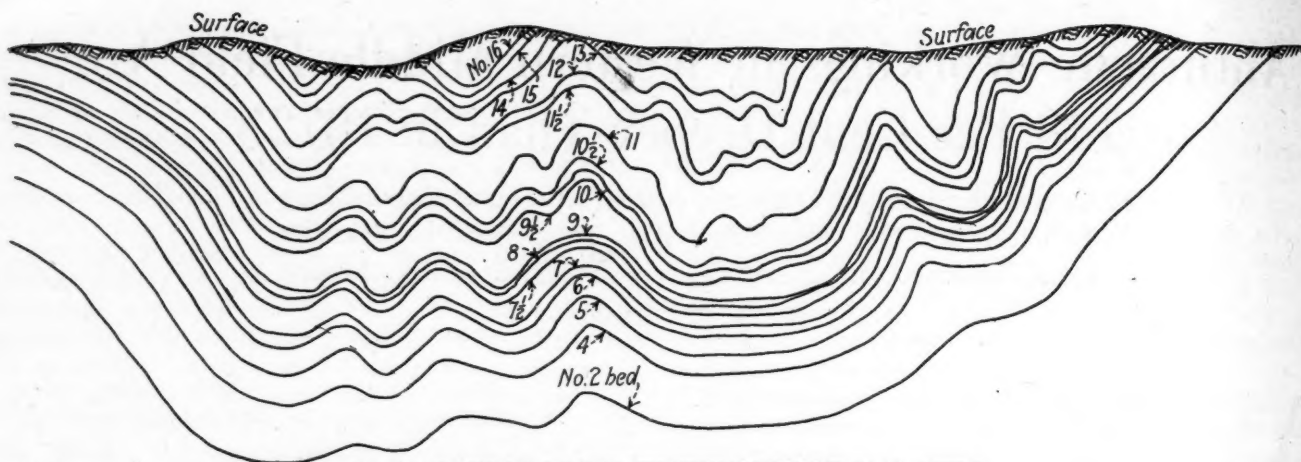


FIG. 63—SECTION OF THE WESTERN MIDDLE COAL FIELD

This section shows that the measures are generally steeply pitching, but that at the bottom, the basin, instead of having sharp angles, is flattened out.

something like two "U"s standing side by side with the middle members extending only half way to the top.

Coal beds in this region are more numerous than in either the Eastern Middle field or the Panther Creek district but are thinner. In the sixteen collieries reporting on thickness only two reported beds as thick as 30 ft.

The names of the beds from the surface downward are as follows: Little Tracy or No. 16, Big Tracy or No. 15, Diamond or No. 14, No. 13½, No. 13, Orchard or No. 12, Primrose or No. 11, Top Holmes or No. 10½,

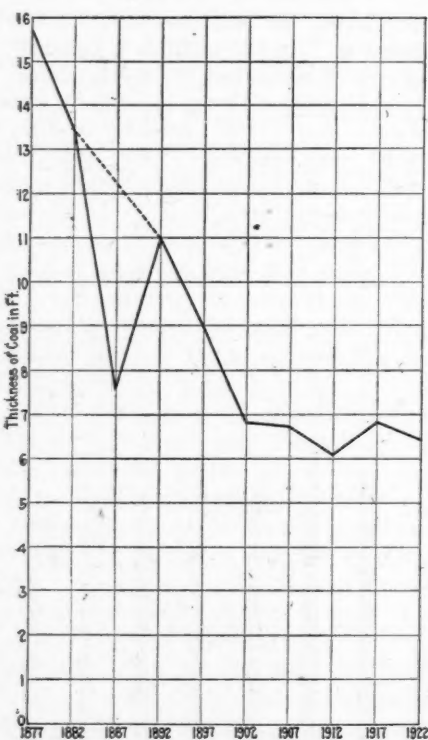


FIG. 64—AVERAGE THICKNESS OF COAL MINED IN THE WESTERN MIDDLE FIELD

The methods used in the calculation were explained in the caption under Fig. 3 in the issue of *Coal Age* for Feb. 28, 1923.

available data were from collieries which had reported thick beds in 1882 and in 1892. Therefore it is reasonable to suppose that the curve really decreased as shown in the dash line instead of the solid line.

In studying Fig. 65 it will be seen that even in 1872

beds of coal as thin as 2 to 3 ft. were mined. Evidently the mining of this thin coal was not considered profitable, for in 1877 it was not reported. In 1902, however, over 11 per cent of the beds were less than 3 ft. thick, and this percentage increased to 13 per cent in 1922. Although there are comparatively few observations used in the preparation of this curve, the general tendency is for thick beds to decrease in number and thin beds to increase.

The general shape of the curve for depth of workings is like the teeth of a saw. There were not a sufficient number of observations to smooth out the curve, but the general characteristics are shown. Here the curve shows that workings steadily grew deeper, and if a general curve were drawn to do away with the irregularities, it would be found that in 1877 the depth was 224 ft. and by 1921 this average depth had increased to about 555 ft., an increase in depth of 331 ft., or about 148 per cent. In the earlier periods, particularly during the seventies, when the easily procured coal in each mine was extracted the colliery was abandoned. This accounts for the rapid increase in the depth of

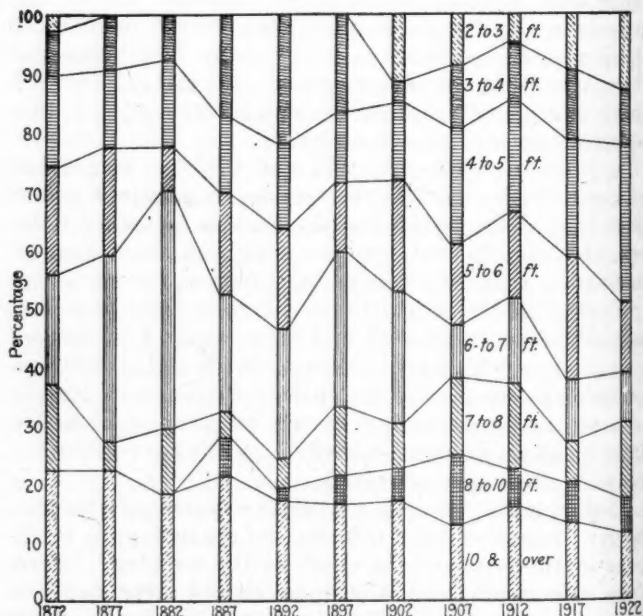


FIG. 65—PERCENTAGE DISTRIBUTION OF NUMBER OF BEDS WORKED BY THICKNESS IN WESTERN MIDDLE FIELD

A description of the methods used in calculating this curve are shown in the caption under Fig. 4 in the first article of this issue, appearing in *Coal Age* for Feb. 22, 1923, on page 324.

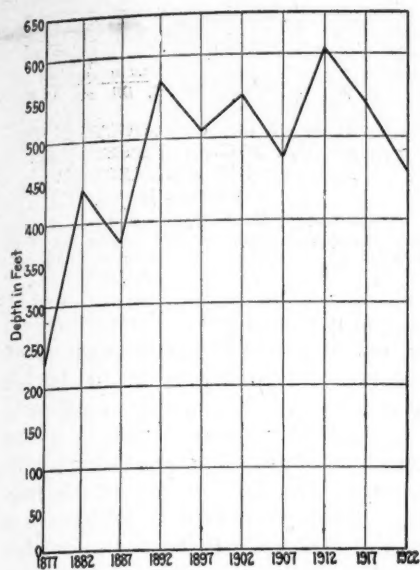


FIG. 66—HOW DEPTH OF WORKINGS HAS CHANGED IN THE WESTERN MIDDLE FIELD

The description of the methods used in the calculation of this curve will be found in the caption to Fig. 5 in the Feb. 22, 1923, issue of *Coal Age*, on page 325.

A continual increase took place. In 1872 the deepest workings lay in the 400 to 500 ft. interval, but by 1922 workings were reported as deep as 1,400 ft. and in 1912 one colliery reported workings between 1,600 and 1,700 ft. deep.

The change in bed thickness at various depth intervals is shown in Fig. 68. Even though there were insufficient data available, the thickness curve is downward almost uniformly. The thickness of the beds is less than that of the Eastern Middle field and the Panther Creek district.

Reports of state mine inspectors of the amount of boiler-horsepower installed go back only to 1887, the first year that the electric locomotive was used in anthracite mines. In the period 1887 to 1897 inclusive there was produced daily about 0.9 ton of coal for each boiler-horsepower. But in the periods ending 1902 and 1907 there was a considerable drop in this figure. This probably was due to the increased depth of workings and the extension of underground workings as well as to increased production. But from 1907 onward production remained practically constant. This was in spite of the fact that the depth of workings continued to increase and the thickness of the beds continued to decrease. It can be explained by pointing to the introduction of electricity. During this period there was a considerable increase in the use of electric power. This resulted in power economies. Further, a number of the coal companies, instead of installing modern boiler houses and power plants at their collieries, discontinued the old out-of-date plants and purchased their power from central stations. As a result, power consumption per ton of coal did not change materially.

TABLE LI—AVERAGE DEPTH AND THICKNESS OF COAL MINED IN THE WESTERN MIDDLE FIELD, IN FEET

	Average Thickness Of Beds	Average Depth of Workings		Average Thickness Of Beds	Average Depth of Workings
1877.....	15.77	223	1902.....	6.84	552
1882.....	13.4	441	1907.....	6.74	684
1887.....	7.53	375	1912.....	6.55	608
1892.....	11.02	570	1917.....	6.81	543
1897.....	9.00	518	1922.....	6.47	459

the workings for the early periods. If the imaginary curve is considered it will be seen that from 1887 such a curve would flatten considerably, for in that year the average depth was about 420 ft. as against 555 ft. in 1921. This was an increase of 135 ft., or only 32.1 per cent, as against an increase of 148 per cent for the full period covered by the curve. Fig. 67 shows the percentage of workings at various depth intervals.

TABLE LII—POWER USED IN THE PRODUCTION OF COAL IN THE WESTERN MIDDLE FIELD

	Boiler Horsepower Installed	Engine Horsepower Installed	Tons Produced Per Boiler Horsepower	Tons Produced Per Engine Horsepower
1887.....	48,570	.....	0.853	.....
1892.....	53,250	.....	0.944	.....
1897.....	70,000	.....	0.946	.....
1902.....	89,044	120,884	0.722	0.532
1907.....	107,395	106,660	0.560	0.564
1912.....	112,745	178,011	0.557	0.353
1917.....	115,850	195,149	0.566	0.336
1922.....	106,388	.....	0.540	.....

Data on haulage is incomplete for the periods previous to 1887, so it is impossible to use these data for the early years. Since 1887 the daily average hauled per mule shows a steady increase; this, however, is not due to any increased efficiency on the part of the mule but entirely to the introduction of the electric locomotive. Part of it, however, may be due to better track layout and maintenance, the introduction of heavier rails and increased use of roller bearings. All of this would tend to increase the amount of coal hauled per day either by mule or locomotive.

Sometime before 1902, according to Fig. 70, the electric locomotive was first used in the Western Middle field, and the increase in its use has been steady, as is shown in the curve and the figures given in Table LIV. The tonnage hauled per locomotive, however, has gradually decreased as the electric locomotive has changed from exclusively main-line haulage to gathering. Both cable-reel and storage-battery locomotives are in this service.

From a study of the mine inspectors' reports from 1872 to date one comes to the conclusion that there have been three distinct divisions in the history of the past 50 years of the Western Middle field with the dividing points in 1887 and 1907. In the early division a colliery was opened for a short time, the best coal mined and the operation then abandoned. This division seemed to end at about 1887. Then came a time of adjustment. Mining methods changed, colliery operation became more stable and the consolidation of collieries began.

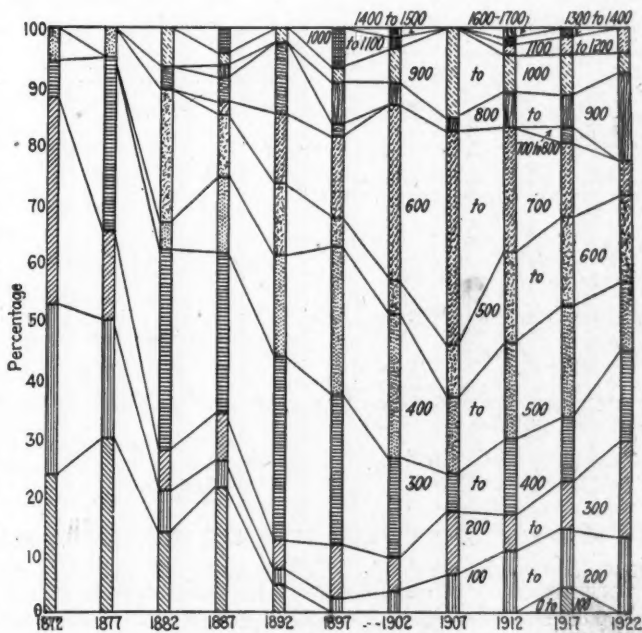


FIG. 67—PERCENTAGE DISTRIBUTION OF BEDS WORKED AT EACH 100-FT. INTERVAL OF DEPTH

In the caption to Fig. 6 on page 325 of the Feb. 22, 1923, issue of *Coal Age* will be found the description of how this curve was obtained.

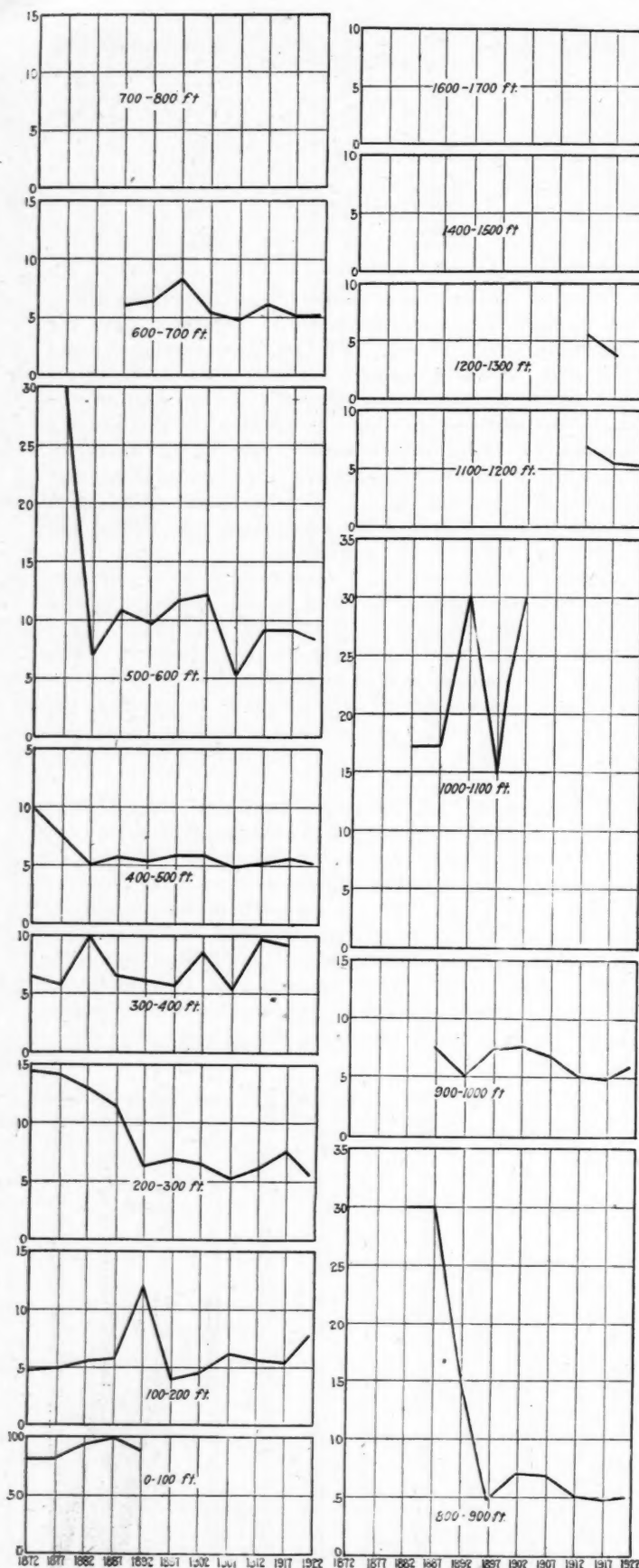


FIG. 68—AVERAGE THICKNESS OF BEDS AT EACH 100-FT. INTERVAL OF DEPTH IN THE WESTERN MIDDLE FIELD

A description of the method used in preparing this curve will be found in the caption to Fig. 7 in Part I of this series, on page 326 of *Coal Age* for Feb. 22, 1923.

This seems to have lasted until about 1907, when the time of modern mining began. Of course all of these

divisions overlapped but the dividing dates are accurate, taking the field as a whole. One of the indications that these general changes took place is the curve for the daily average production per employee. The final curve, which is the dot and dash line in the bottom group of curves in Fig. 71, shows a decided drop in the period 1877 to 1887, but from 1887 to 1907 the line is practically level but showing a slight downward tendency if the 1897 figures are omitted because of errors that year in state inspectors' reports. The drop in output per man is only 0.04 ton a day. Then from 1907 to 1921 there is a considerable increase in the production per man from 1.50 tons to 1.80 tons.

The total change in production from 1877 to 1921 is a decrease of 0.18 ton, or 9.1 per cent. This decrease in output is less than in any of the previously described districts, for the Lackawanna County district shows a decrease of 31.2 per cent, the Wilkes-Barre district, 30.2 per cent, the Nanticoke district 21.1 per cent, the Eastern Middle field 30.6 per cent and the Panther Creek district an increase of 1.6 per cent, or—if 1892 data is used—a decrease of 12.5 per cent.

The dot and dash line in the middle group of curves in Fig. 71 is the final corrected line showing the average daily output per inside employee. This curve shows a steadily decreasing output from 1877 to 1907 but an increase after that. The decrease before 1907 is in conformity with the results in previously described districts, but the increase in the last three periods in the production per man does not compare with what has been shown before. This increased production has been influenced to some extent by the introduction of electric haulage underground and also slightly by the increased use of mechanical mining devices. The uppermost set of curves in Fig. 71 shows the average daily output per outside employee. Here, as is to be expected, in the earliest years there is a decrease in production, and then as preparation of coal gradually turned from hand work to mechanical there was a marked increase. This increase begins with 1892 and extends to 1921.

In Fig. 72 the lowest set of curves shows the average daily output per miner and miner's laborer. From 1877 to 1887 there was a sharp drop. If 1897 is ignored, for reasons explained in preceding articles in this series, then from 1902 to 1921 there is a slight decrease in output, discounting also the production during

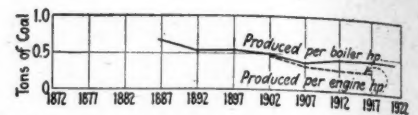


FIG. 69—DAILY PRODUCTION OF COAL PER BOILER HORSEPOWER AND ENGINE HORSEPOWER INSTALLED

The method of calculating these curves is found under the caption to Fig. 8 in the issue of *Coal Age* for Feb. 22, 1923, on page 327.

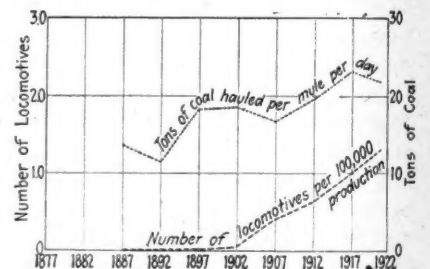


FIG. 70—AVERAGE DAILY TONNAGE HAULED PER MULE AND NUMBER OF UNDERGROUND LOCOMOTIVES PER 100,000 TONS IN THE WESTERN MIDDLE FIELD

A description of the methods used in the calculation of these curves will be found in the caption to Fig. 9 in Part I of this series of articles, appearing in *Coal Age* of Feb. 22, 1923.

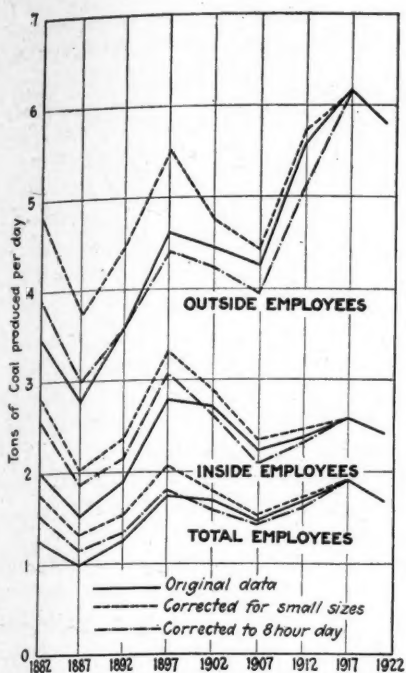


FIG. 71—AVERAGE DAILY PRODUCTION OF COAL PER EMPLOYEE IN THE WESTERN MIDDLE FIELD

This curve gives the average daily production per outside employee, per inside employee and per total employee. A short description of the methods used in the calculations of these curves will be found in the caption to Fig. 10 in the first article of this series, appearing on page 327 in the Feb. 22, 1923, issue of *Coal Age*.

region—Eastern Middle field, 37.9 per cent; Panther Creek district, 27.9 per cent—the lowest decrease in the whole region—Western Middle field, about 41.9 per cent, which is close to the average.

As an example of the change in mining conditions from old to new there exists a condition at one of the collieries in this district which is typical. According to the mine maps, the Mammoth bed of coal had been completely worked out and robbed. While making an estimate of the coal remaining in the property an investigation showed that this bed was about 24 ft. thick over the property and that in the old mining they had taken only 8 ft. of the best coal and the rest had been left behind as valueless. In this whole area not only had first mining been done in the 8 ft. of coal but also second mining had been completed and the top brought down.

The Mammoth bed has been opened up again and the remaining 16 ft. of coal is now being removed. It is more difficult to remove this coal than if there had been

the war year of 1917. Then this curve conforms with the results that have been found in the districts previously described. In fact this district comes close to the average of the other districts in the amount of the decrease in the production per miner and miner's laborer. In the Lackawanna County district the decrease in output was 43.7 per cent; Wilkes-Barre district, 42.9 per cent; Nanticoke district, 54.2 per cent—the greatest decrease in the anthracite

TABLE LV—PRODUCTION AND DAYS WORKED AT ANTHRACITE COLLIERIES IN THE WESTERN MIDDLE FIELD

	Production in Gross Tons	Average Days Worked		Production in Gross Tons	Average Days Worked
1877	5,160,200	187	1902	6,846,900	116
1882	7,694,100	234	1907	15,004,600	265
1887	9,249,300	220	1912	14,014,000	228
1892	9,743,300	204	1917	17,145,500	278
1897	9,042,500	149	1921	16,333,593	282

TABLE LVI—COMPARISON OF AVERAGE OUTPUT PER MAN BY CLASSES OF EMPLOYEES

	Per Total Employee			Per Inside Employee			Per Outside Employee		
	Reported	Corrected for Small Sizes	Corrected for 8-hr. day	Reported	Corrected for Small Sizes	Corrected for 8-hr. day	Reported	Corrected for Small Sizes	Corrected for 8-hr. day
1877....	1.63	2.32	1.98	3.00	4.27	3.85	3.54	5.04	4.03
1882....	1.56	2.17	1.87	2.75	3.83	3.50	3.58	4.97	3.98
1887....	1.43	1.77	1.54	2.41	3.40	3.11	3.55	4.39	3.51
1892....	1.47	1.79	1.54	2.40	2.94	2.68	3.46	4.22	3.37
1897....	1.80	2.10	1.82	2.93	3.42	3.18	4.64	5.42	4.34
1902....	1.71	1.82	1.58	2.76	2.93	2.68	4.46	4.74	4.22
1907....	1.57	1.62	1.50	2.40	2.49	2.36	4.53	4.71	4.19
1912....	1.74	1.77	1.65	2.55	2.60	2.46	5.52	5.74	5.10
1917....	2.00	2.00	2.00	3.00	3.00	3.00	6.06	6.06	6.06
1921....	1.80	1.80	1.80	2.65	2.65	2.65	5.70	5.70	5.70

no mining done in the seam. This therefore means that the production per miner and miner's laborer is lower in this bed than it would be if the coal had not been touched or if first mining had been completed only in the full bed.

Conditions like these are found in many parts of not only this district but others. Areas of coal have been left behind because the coal was not of a sufficiently

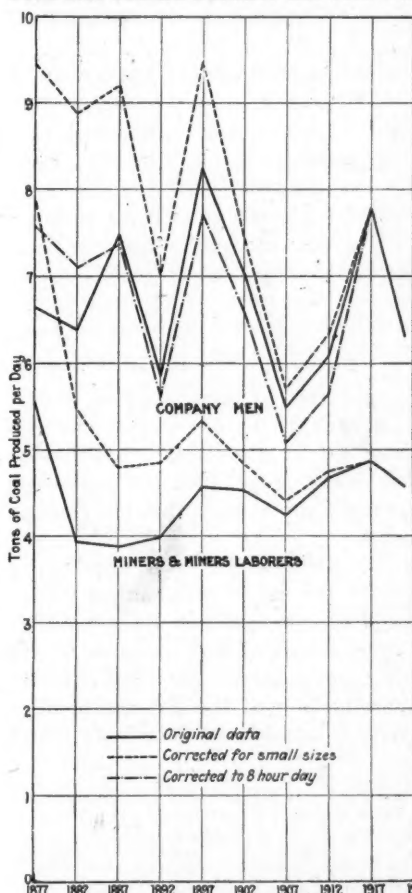


FIG. 72—AVERAGE DAILY PRODUCTION FOR INSIDE EMPLOYEE IN THE WESTERN MIDDLE FIELD

In the issue of *Coal Age* for Feb. 22, 1923, on page 328 the description of the method used in the calculation of these curves is given.

high quality or because it had become thinner. The coal surrounding it had been completely mined and the roof caved, the virgin coal left behind being rendered much more difficult of recovery. All of these things tend to reduce the production per miner and miner's laborer and therefore per employee. The curve for average daily production per inside company employee presents a saw tooth appearance. If 1897 reports are considered valueless, however, and the average for 1892 and 1902 is taken instead, the curve assumes a more natural

TABLE LVII—AVERAGE DAILY TONNAGE HAULED PER MULE AND NUMBER OF UNDERGROUND LOCOMOTIVES PER 100,000 TONS OF ANNUAL PRODUCTION

	Tons Hauled Per Mule	Number of Underground Locomotives Per 100,000 Tons Annual Production		Tons Hauled Per Mule	Number of Underground Locomotives Per 100,000 Tons Annual Production
1887	15.01	...	1907	17.18	0.23
1892	15.62	...	1912	21.50	0.54
1897	18.60	...	1917	25.02	0.86
1902	18.85	0.08	1921	22.90	1.17

TABLE LVIII—MULES AND LOCOMOTIVES IN THE WESTERN MIDDLE COAL FIELD

	Number of Mules	Number of Locomotives		Number of Mules	Number of Locomotives
1887	2,759	...	1907	3,496	41
1892	3,219	...	1912	2,923	102
1897	3,559	...	1917	2,608	682
1902	3,412	16	1921	2,503	202

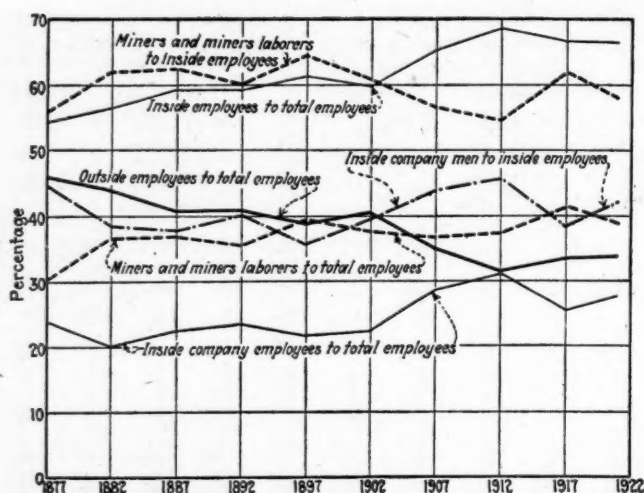


FIG. 73—PERCENTAGE OF EMPLOYEES BY CLASSES IN THE WESTERN MIDDLE FIELD

The data for these curves were obtained from the mine inspector's reports of the Pennsylvania Department of Mines.

shape. Here then we have a generally decreasing average daily output per man from 1877 to 1907. But from 1907 to 1921 it increases if the production for the war year 1917 is properly discounted. This increase in the production per man probably is influenced to a considerable extent by the introduction of underground electric-locomotive haulage. This naturally tends to decrease the number of mules and consequently, the drivers.

With the introduction of underground mechanical

TABLE LVII—AVERAGE DAILY PRODUCTION OF INSIDE MEN IN GROSS TONS

	Miners and miners' Laborers		Inside Company Men		Men Corrected to 8-Hr. Day
	Reported	Corrected for Small Sizes	Reported	Corrected for Small Sizes	
1877.....	5.54	7.86	6.64	9.44	7.56
1882.....	3.94	5.48	6.38	8.87	7.10
1887.....	3.88	4.80	7.48	9.20	7.36
1892.....	3.99	4.86	5.84	7.00	5.60
1897.....	4.57	5.34	8.22	9.50	7.70
1902.....	4.53	4.83	7.04	7.49	6.57
1907.....	4.25	4.42	5.48	5.71	5.08
1912.....	4.66	4.75	6.09	6.34	5.64
1917.....	4.86	4.86	7.82	7.82	7.82
1921.....	4.57	4.57	6.31	6.31	6.31

haulage it has become possible to haul the coal underground longer distances with more convenience than on the surface. This has led to consolidation of mine openings and therefore hoisting engines for numerous slopes and shafts have been abandoned, thus decreasing the number of engineers.

Another cause for the decrease in the number of underground employees is the use of mechanical means for caging mine cars. At some mines it is possible by the use of such mechanical caging devices to cut in half the number of men required for this purpose. At some mines the introduction of the automatic mine door has done away with a number of door boys which

TABLE LVIII—MEN EMPLOYED IN THE PRODUCTION OF ANTHRACITE COAL IN THE WESTERN MIDDLE FIELD

	Total Employees	Inside Employees	Outside Employees	Miners and Miners Laborers	Inside Company Men
1877	17,020	9,208	7,812	.....	.....
1882	21,099	11,926	9,205	.....	.....
1887	29,432	17,439	11,823	10,828	6,611
1892	33,736	19,926	13,810	11,959	7,967
1897	33,720	20,651	13,067	13,283	7,368
1902	34,658	21,371	13,216	13,004	8,367
1907	36,216	23,610	12,515	13,300	10,310
1912	35,420	24,286	11,124	13,192	11,094
1917	30,729	20,558	10,171	12,669	8,889
1921	32,177	21,836	10,141	12,662	9,174

TABLE LIX—PERCENTAGES OF GIVEN CLASSES OF EMPLOYEES TO TOTAL EMPLOYED

	Inside	Outside	Miners and Miners' Laborers	Inside Company Men	Miners and Miners' Laborers* (A)	Inside Company Men (A)
1877.....	54.1	45.9	30.1	24.0	55.6	44.4
1882.....	56.4	43.6	36.3	20.1	61.8	38.2
1887.....	59.2	40.8	36.9	22.3	62.2	37.8
1892.....	59.1	40.9	35.5	23.4	60.0	40.0
1897.....	61.2	38.8	39.4	21.8	64.3	35.7
1902.....	59.7	40.3	37.6	22.1	60.9	39.1
1907.....	65.2	34.8	36.8	38.4	56.4	43.6
1912.....	68.6	31.4	37.3	31.3	54.4	45.6
1917.....	66.8	33.2	41.2	25.4	61.7	38.3
1921.....	66.7	33.3	39.0	27.7	58.0	42.0

* Percentage to inside employees.

otherwise would be needed. The construction of overcasts has to some extent done away with a number of door boys in the mine. The design and construction of central pumping plants has reduced the number of pumpmen. Each of these factors in itself effects only a small saving but all together they substantially reduce the size of company payrolls.

Fig. 73 shows the relationship between the different classes of employees. As in all previous cases there is a steadily increasing proportion of inside employees to total employees. For the same tonnage the number of outside men required is steadily decreasing as new improvements are made in the methods of preparing coal for the market. For a long period the proportion of inside company men, miners and miners' laborers increased, but in the last few years the increase has been confined to the miners and miners' laborers, whereas the inside company men have decreased. This has been brought out in detail previously in this article.

How Roller-Bearing Wheels Reduce Operating Costs*

BY P. B. LIEBERMANN

Industrial Engineer, Hyatt Roller-Bearing Co., Harrison, N. J.

PROMINENT among the claims of the present users of roller-bearing trucks are that they afford an economy in power. Roller bearings will use only 50 per cent of the power that would be needed to haul plain-bearing cars of the same gross weight. As cars with roller bearings are easily pushed by hand the men who have to handle them are better contented and more productive, and where mules are used for haulage their general condition and endurance measured in cars hauled is observed to be bettered.

By the introduction of roller bearings more trips have been hauled and more cars per trip. The easy-running roller-bearing trucks have decreased the maintenance charges of haulage and of gathering locomotives. Mine trucks equipped with roller bearings of the flexible type have been found to start with an expenditure of about one-fifth of the power needed to start plain-bearing cars of the same size. All this means that the strains on cars, motors, storage batteries, mules or miners—whichever furnish the motive power—are greatly reduced. Where mechanical power is used the repair bills are much lowered.

The cost of lubricating roller-bearing trucks is one-fifth of that of lubricating an equal number of trucks equipped with plain bearings, for roller-bearing trucks require lubrication as an average only three or four times a year. The lubricant stays in the wheels and does not leak onto the ground. This efficiency is aided by the fact that wheels equipped with roller bearings

*Article entitled "Roller-Bearing Mine Trucks," read before Illinois Mining Institute.

cannot gauge out in the hub. In consequence they do not get wobbly. Hence, wrecks due to worn wheels are practically eliminated.

Where correctly housed and handled with reasonable care roller bearings give satisfactory service over an extended period. Some which have been in operation from twelve to fifteen years are still in serviceable condition.

The power-saving advantages which roller bearings afford have been recognized in a practical way for many years, but in order to have absolutely authentic proof of their value the Hyatt Roller Bearing Co. several years ago constructed a dynamometer car by which tests were conducted at a number of coal mines under actual operating conditions. The average power saving was shown to be 53½ per cent on level track, under average haulage conditions.

The adoption of roller-bearing trucks in general and the dynamometer tests in particular had a highly educational effect in so far as they emphasized the importance of related subjects, such as the keeping of mine tracks in good condition with rails fairly clean, and the arrangement of grades so as to get the greatest benefit out of the use of roller-bearing equipment.

EQUAL TRACTIVE EFFORT GOING AND RETURNING

As far as grades are concerned the consumption of power naturally is least under "equalized conditions" of drawbar pull—that is, when the grades are such that the same effort is required to move a train of loaded cars out of the mine as it takes to move an empty train in. Under these circumstances the capital invested in the whole haulage system is a minimum. By comparing the train resistance for the different types of wheels it is obvious that different grades are needed, depending upon the type of bearing used. The "equalizing grade" for plain-bearing cars is about twice as steep as the grade for roller-bearing cars and the necessary size of locomotive as well as the power consumption is correspondingly greater.

It is evident that not every mine can be laid out for the ideal grade but at the same time it is surprising what can be accomplished by the gradual elimination of existing steep grades. These are a continual source of trouble and expense and it is frequently less costly to accomplish a permanent remedy than to drag along day after day under adverse conditions.

It can easily be seen that a power saving can be accomplished by the use of roller-bearing cars on any grade which may occur in a mine, but the steeper the grade the more the bearing friction becomes overshadowed by the effect of gravity. Consequently, no great increase in train length or production can be expected when the loaded cars must be hauled up a continuous steep grade, but where the gradients do not exceed 5 or 6 per cent roller-bearing cars readily show the gain which their easier running qualities afford.

Assuming that roller-bearing trucks are adopted and that full advantage is sought from the ideal grade that goes with them, the question then arises what that grade is. This can be determined from the formula given on page 1,057 of Bulletin No. 127, July, 1917, American Institute of Mining Engineers, namely:

$$G = \frac{(W_L + R_L) - (W_E + R_E)}{20 (W_E + W_L + 2M)}$$

Where, G = percentage of the desired grade; W_L = weight of a train of loaded cars in tons; R_L = train resistance of loaded cars in pounds per ton; W_E =

weight of a train of empty cars in tons; R_E = train resistance of empty cars in pounds per ton; 20 = gravity force in pounds per ton per 1 per cent of grade; and M = weight of locomotive in tons.

In the same bulletin a typical haulage problem was solved which gave for the plain-bearing trucks an equalizing grade of 0.61 per cent and for the roller-bearing trucks a grade of 0.284 per cent. The roller-bearing grade is enough to allow of proper mine drainage and where it can be installed will be entirely practicable in all other respects.

As has been stated, the saving in power and lubrication effected by roller-bearings is appreciable. Furthermore, the lower roller-bearing grade will permit of the use of smaller locomotives, which in turn means lighter rails. This saving also affects favorably the electrical transmission line, transformers and power house. On account of the reduced drawbar pull, derailments are less frequent, the locomotives are operated with greater safety, car and tracks are subject to less wear and the size of the repair shops can be reduced.

The running gear of mine cars varies greatly. There are wheel hub bearings, bearings in outside boxes and bearings in inside boxes, depending on the location of the bearings in relation to the wheels. Besides this there are axles with two loose wheels, axles with one tight and one loose wheel, axles with two tight wheels and axles split in the middle with one wheel on each half.

These different arrangements of bearings and axles undoubtedly will affect the train resistance, particularly on curves. The dynamometer tests, for obvious reasons, were conducted on tangent track, and therefore information on the individual superiority of any one construction over the others was not obtained.

Generally speaking, wheel hub bearings are preferred by mine operators on light mine cars, say up to 3 to 4 tons' capacity, whereas bearings in journal boxes are specified for the heavier cars.

The application of roller bearings to mine trucks does not require any fundamental alterations in the construction of the wheels, axles, or truck body, nor does it involve any important changes in manufacturing methods for the mine-car builder. In their ease of installation, operation and inspection, the Hyatt roller bearing closely resembles plain bearings. It even allows a liberal side play to the axle, which is so much desired by operators because this play makes trains run more easily and with less wear and tear on cars and tracks and also with fewer derailments.

Wheels equipped with roller bearings differ from ordinary plain bore wheels by having a somewhat larger hub diameter. The front end of the hub is mostly constructed to form an enclosure for the bearing and it serves to retain the wheel on the axle by means of an open or enclosed linch pin or key block. The rear end usually is open, which allows machining from this side on a boring mill. Into the bore is inserted a lining of cold-rolled steel. The rollers are self-contained and after being placed in the hub the latter is closed by means of an end plate or cap of suitable design.

The side thrust on these wheels is taken in the same way as on plain bore wheels—that is, by means of one or more loose washers inserted between the rear end of wheel hub and the axle box. The loose washers have a tendency to reduce friction at this place and to equalize wear and reduce it to a negligible quantity.

When roller bearings were first applied to mine-car wheels they were installed according to the practice

followed in the installation of wheels having a plain bore. So, for instance, the center of the bearing was located perpendicularly over the center of the rail. It was soon found, however, that such a construction was faulty both for roller-bearing and plain wheels, inasmuch as it was observed that the bearings and axles showed signs of wear toward the rear of the wheel. The center of the bearing was then shifted until the load appeared to be distributed uniformly all over the bearing seat. In this event it was found that the center of the bearing coincided with the gage line of the track and therefore this arrangement has been followed ever since.

To obtain proper stability for the wheel itself the length of the bearing should have a certain definite relation to the wheel diameter. For instance, it has been found good practice to install a bearing 6 in. long in a wheel of 12-in. diameter, a bearing 7 in. long in a wheel of 14- or 16-in. diameter and two bearings 4 in. long in a wheel of 18-in. diameter.

The journal boxes should by all means be self-aligning in order to allow the box at all times to follow the axle unaffected by distortions of the truck body. The bearing is retained in a journal box in the same way in which it is housed in a wheel hub—that is, the box has one open and one closed end. The open end is covered by means of a plate or cap of suitable design. Some of the heaviest mine cars have springs put over the journal boxes which equalize the load on the bearings and greatly increase the life of the mine cars as a whole.

HIGH-CARBON HEAT-TREATED CAR AXLES FAVORED

The axles which are recommended are of 0.40 to 0.50 per cent carbon-content steel. Low-carbon axles should never be used, for they will wear infinitely quicker than those with a higher carbon percentage. The slight additional cost of the 0.40 to 0.50 carbon steel is insignificant when considering the wonderful increase in the life of the whole equipment. The steel should preferably be cold-rolled, not machined, at the seat of the bearing. The limits of diameter within which such steel is furnished commercially are such as to make it possible to use the product of the mill with entire satisfaction without any machining operation except the cutting of the steel into proper lengths and the drilling or grooving of it for the retention of the wheels.

Much progress has been made of late in the use of heat-treated axles. These have quite an advantage over ordinary axles and are desirable for the following reasons: (1) They have many times the strength of an ordinary low-carbon axle. The chance of bending or breaking in service is comparatively remote. (2) They are ductile enough if properly tempered, to make them withstand the shocks and abuse of ordinary mine service. (3) On account of the thorough intermixing of the carbon with the iron, the wear at the journals is negligible without necessarily causing additional wear in the wheel hubs or bearing boxes.

The advantages to be derived from heat-treated axles for mine cars were not appreciated until a few years ago, when the ever-increasing demand for greater load capacity, for greater speed and quite often for longer trips set up a demand for better axle material. The advantages arising from their use are well illustrated by the experience of a prominent producing company which stated that "before using heat-treated axles, we sold about a car and a half of scrap axles every year,

but since we have been using heat-treated axles we have not sold one in seven years."

Roller bearings must be lubricated in order to reduce the wear of the rolling surfaces to a negligible minimum and to prevent the formation of rust. The thinnest lubricant would be the most efficient, but on account of unavoidable leakage it would be the least economical and therefore heavier lubricants are recommended. Such heavier lubricants are really liquid greases. Lubricating greases are mineral oils which are artificially thickened by dissolving soap in them.

Lime, soda or lead soaps made with various fats and oils usually are employed for this purpose. The lime soaps are preferable for mine-car service because they can be used without harmful results when moisture is present. It is essential that a high-grade mineral oil be used in a grease for roller bearings and that there be present no free alkali or free acid. Most greases contain a trace of the latter. The maximum quantity of free acid should not in any case exceed 0.25 per cent. In general, a suitable lubricant should have the following requirements: (1) It must not produce any corrosive action either originally or through deterioration. (2) It must be liquid enough to flow between the rollers at ordinary temperatures and also at lower temperatures down to at least 10 deg. F.

The economy of a suitable lubricant applied to a correctly housed roller bearing is remarkable. Three or four fillings per year as an average are all that are necessary for Hyatt bearings.

If the cars are lubricated three times a year it means that the cost of grease will be about \$1.20 per car per year, figuring on the application of one pound of grease to each wheel each time a car is greased, or, in other words, a total of 12 lb. of grease would be used, which can be bought at an average price of 10c. per pound.

The cost of applying the grease has been determined by mine operators as being in the neighborhood of 30c. to 40c. per car per year, so that the total cost of lubricating a car for a year would be approximately \$1.50 to \$1.60. Some operators lubricate their Hyatt-equipped cars for as little as 70c. a year.

Extended oiling periods—that is, the lubrication of cars once every nine or twelve months—are purposely not recommended for the reason that it is felt that the operator sacrifices several years of life in an endeavor to save a few cents per car per year. It is better to waste a little lubricant than it is to jeopardize the success of the equipment.

It has been developed by a number of operators that it costs in the neighborhood of \$4.50 to \$5 to lubricate a plain-bearing car for a period of one year. These figures include the cost of labor and black oil, which is the lubricant commonly used.

In conclusion, it is only fair to say that during the early stages of the use of roller bearings all the advantages claimed were not realized to the same degree as they are now. The construction of the bearings themselves, the wheels, journal boxes, axles, lubricants, etc., all had to be developed and improved to take care of the severest mine-haulage conditions and to keep step with the general progress in truck building that took place at the same time.

By persistent efforts all weak spots were eliminated to such an extent that during the past six or seven years nothing has happened to indicate that there is anything that could be done to improve the methods of manufacture and the subsequent operation of the trucks.

Quick and Simple Way of Testing for Carbon Monoxide In the Blood or in the Atmosphere

Qualitative Test Takes Three Minutes, Quantitative Fifteen—Blood Carefully Mixed with Water and Treated with Tannic and Pyrogalllic Acid—Pollution Determined by Comparison of Color with Standards

By N. C. MCLoud
Baltimore, Md.

SUCCESSFUL combat against carbon monoxide, the most insidious and one of the most deadly of poisonous gases, is involved in a momentous discovery just announced by the U. S. Bureau of Mines.

The greatest danger from this gas in the past has been due to the impossibility of detecting its presence. The gas is colorless and has no odor or taste in the percentages usually encountered. For this reason, victims of the poison have no way of knowing whether they are exposed to the gas until the toxic effects are well under way. Diagnosis of the poisoning has been difficult for the reason that carbon monoxide often appears in unsuspected places and may be absent where it might be expected, and further, because the symptoms of this type of poisoning are the same as those caused by other forms of ailment.

Through investigations conducted by technical experts for the government; detection of the gas and diagnosis of the symptoms have been greatly simplified. For some time past the Bureau of Mines has been conducting reasearch work on this subject. As a result, means have been found by which it is possible to discover within three minutes the extent to which a person has been affected by carbon monoxide. Formerly the presence of the gas could be diagnosed only after from 24 to 48 hours, even when the services of a hospital or well-equipped laboratories and a skilled chemist were available.

Under the new method the test is effected by the use of a simple and inexpensive instrument which may be carried in the pocket and which requires no special training for its operation. It is expected that many lives will be saved by a general adoption of this mode of finding gas poisoning, not only in the mining industry but also in other fields where this gas is a menace. With this quick method of diagnosis it is possible promptly to put in operation the proper emergency treatment, a course impossible without a rapid diagnosis.

The widespread danger from monoxide is clearly recognized. It exists in countless places, from coal mines to homes in which gas is used for heating and cooking. It is generated by the imperfect combustion of explosives. It is found in the atmosphere around coke ovens, in the smoke from burning buildings and in garages where poor ventilation permits the accumulation of the exhaust gases of automobiles. Citizens in all walks of life are subject to possible exposure to the deadly fumes, and because of this the new instrument is expected to be generally used by physicians, according to Dr. Hubert Work, Secretary of the Interior and a former president of the American Medical Association.

It is stated by the Bureau of Mines that the only infallible test for carbon-monoxide poisoning is by examining the blood. The instrument devised for this purpose and the method of its use have been evolved by

Dr. R. R. Sayers, chief surgeon of the Bureau, with the collaboration of W. P. Yant, chemist at the Pittsburgh Experiment Station. For detecting the presence of the gas in air the method consists primarily of taking a sample of normal human blood, diluting it with water and shaking the mixture into equilibrium with the gas. By this means the amount of carbon monoxide in the air may be determined in low concentrations to an accuracy within one-tenth of 1 per cent. The same apparatus can be used for determining carbon monoxide in the blood of a supposedly poisoned patient. The apparatus is simple, portable and compact, and the making of determinations requires no special skill.

Many methods for the detection of carbon monoxide in the blood have been developed, but owing to their various individual disadvantages, they have never come into common use. Some of the quantitative methods are satisfactory from a standpoint of accuracy, but require elaborate and expensive apparatus, special technique and training, or are too delicate and cumbersome for field use. The Bureau's instrument overcomes all these obstacles and affords an apparatus which should not cost, at the outside, more than \$25 or \$30. A statement prepared by the Bureau says:

"It is of vital importance in all industrial and domestic accidents occurring at places where carbon monoxide might be suspected or where the symptoms are typical of carbon-monoxide poisoning, that a qualitative and, preferably, a quantitative determination be made to show the presence or absence of carbon monoxide. The latter is preferable because the extent of the poisoning is of importance in deciding whether carbon monoxide is a direct or contributory cause. This is, indeed, essential from a medical standpoint, as it aids in prescribing treatment, and, from a legal standpoint, to insure justice in the claims that are often unjustly decided for want of positive evidence.

"In view of the foregoing, an apparatus has been designed which gives accurate results in the field and

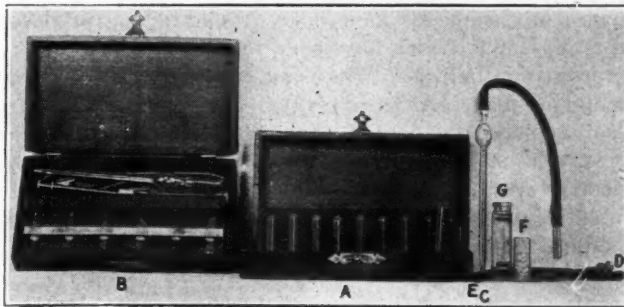


FIG. 1—KIT TO TEST FOR CARBON MONOXIDE IN BLOOD
A, tube of sample colors for comparison with that of the test sample; B, test tubes for preparing blood, dilution pipette (also C); hemospast (also D) and rubber hose (also E) for the binding of the patient's finger; F, capsules of tannic and pyrogalllic acid, G, water bottle.

laboratory, yet is so compact that it can be carried in the pocket, though durable and sufficiently simple in operation to be used without special training. By use of the method to be described it is possible to detect the presence of carbon monoxide in the blood in three minutes and to determine the exact quantity present within fifteen minutes, and, on the basis of these findings, to administer treatment. The method and apparatus should fill the needs of hospitals, industrial surgeons, safety engineers, coroners, departments of public safety, boards of health and other allied agencies."

The method is based on the fact that a light brownish-gray substance is suspended in the liquid after a few minutes when normal blood is diluted with water and treated with a solution of tannic and pyrogallic acids. In blood having carbon monoxide in combination with all of the hemoglobin the suspension is light carmine. Carrying this a step further it is found that in any mixture of normal blood with blood containing carbon monoxide, the suspension which is formed will be a corresponding mixture of the two extremes of color. Consequently for tests according to the method installed by the Bureau a set of standards, or vitals are provided, variously colored to represent the different colors produced by varying, but known, percentages of carbon

color of blood having varying quantities of CO.HB (0, 10, 20, 30, etc., per cent), arranged in a rack with spaces between for interposing tubes of similar size containing specimens of blood for analysis. (b) Small test tubes (of the same size and glass as those used for standards) for preparing the specimens of blood. (c) A dilution pipette for measuring blood. The long capillary stem is calibrated with a 0.10 c.c. mark, and the total pipette has a volume of 2.0 c.c. This allows the dilution of 0.10 c.c. sample of blood with water to 2.0 c.c., or a ratio of 1 in 20. (d) A spring hemospast for making small puncture wounds from which blood is obtained. (e) Rubber hose for wrapping the subject's finger during the taking of the blood sample. (f) Tannic-pyrogallic-acid mixture (0.04 gram of a 1:1 mixture) for reducing the colored suspension in the diluted specimen of blood. (g) Small bottle of water for diluting the blood.

All of the above apparatus is arranged in a compact pocket case 3 x 7 x 1½ in.

The procedure is as follows: A small puncture wound (approximately 2 mm. deep) is made with a needle or hemospast in the tip of the finger or other convenient part of the body of the supposed victim of carbon-monoxide poisoning. If the blood does not flow freely the finger may be wrapped with the rubber hose, beginning at the base and progressing toward the tip. Massaging the finger also aids the flow. If death has occurred it may be difficult to obtain liquid blood, but this can be done during the process of embalming. When the blood has been procured it is quickly drawn into the stem of the pipette to the 0.1 c.c. mark.

The pipette is then held in a horizontal position, and any blood on the exterior of the tip is removed. The tip is slightly raised to allow a little of the blood to flow into the diluting bulb, and, by inserting it quickly into the bottle of water, and using suction at the same time, it can be filled to the 2-c.c. mark to give the proper dilution. The blood solution is then discharged into one of the test tubes, a little of the solution being drawn back once or twice into the pipette to wash out any adhering concentrated blood.

The entire procedure of obtaining the blood specimen should be as rapid as possible to eliminate possible clotting. In case it is desired to take more than one sample the pipette can be rinsed out by using a little of the dilution water, being careful to blow the capillary stem free of water before taking the next sample.

Immediately after the blood solution has been discharged into the test tube, the contents of a capsule of the tannic and pyrogallic acid are added, and the tube is inverted three or four times to insure thorough mixing of the reagents. It is then placed in the rack and allowed to stand fifteen minutes at room temperature. It is then compared with the standards by interposing it between them and finding the standard which it most nearly matches in color, and then estimating the percentage of carbon monoxide-hemoglobin from the value of that standard. The value of the standards give directly the quantity of carbon monoxide in the unknown specimen of blood. If carbon monoxide is indicated, the tube should be allowed to stand fifteen minutes longer, taking the latter reading as being the more accurate. Observations may be taken after several hours without serious loss of accuracy, although this is not advisable except in case of necessity.

For determining the presence of carbon monoxide in



FIG. 2—EQUIPMENT WHERE AIR SAMPLES ARE TO BE TESTED

Here are not only sampling tubes, a hemospast, a dilution pipette, capsules and a water bottle but also an aspirator (C) and a flask (B) for the taking of air samples. The aspirator drives the air through a soda-lime scrubber.

monoxide in combination with hemoglobin. By making comparisons, specimens of blood having unknown percentages of carbon monoxide can be matched with these standards and the degree of poisoning accurately appraised by mathematical formula.

"The former technique of making a determination was to prepare standards from blood, but these were not permanent, and the frequent necessity for making them was undesirable," says the statement. "To overcome this, standards have been developed and prepared from pigments, which have been found to be satisfactory for routine analysis. When not in use these standards should be protected from light. The former procedure also involved the use of chemical solutions which deteriorated on standing, and it was necessary to have them freshly prepared. This objection has been eliminated by preparing the chemicals in solid form. These changes, together with the adoption of a solution pipette, have lessened the number of operations and pieces of apparatus required for a determination. The apparatus at all times is ready for use."

The complete outfit is shown in Fig. 1, and consists of the following:

(a) Set of permanent standards made to match the

the air, some additional apparatus is provided, to be used in connection with the set of standards. The outfit includes, as illustrated in Fig. 2, the following: (a) Complete set of standards, as shown in Fig. 1; (b) air-sample bottles of at least 250-c.c. capacity, fitted with rubber stoppers; (c) rubber aspirator bulb with attached "scrubber" (a tube of soda-lime) for removing gases which might have an interfering effect.

In applying this test a sample of air is obtained by inserting the glass tube, on the end of the scrubber, into the sample bottle, as shown in Fig. 2, and then aspirating the air through the sample bottle long enough to purge it of its original contents—at least twenty-five squeezes of the bulb.

The blood to be used in making the analysis should be taken from a person who has not been exposed to carbon monoxide. The 0.10 c.c. of blood is diluted to 2 c.c. All of the 2 c.c. blood solution is discharged immediately from the pipette into the sample bottle.

The atmosphere thus introduced should be brought into equilibrium in a dimly lighted place. After replacing the stopper, the bottle is held horizontally and rotated constantly for fifteen to twenty minutes, violent shaking and agitation being avoided. As much as possible of the surface of the bottle should be covered with the blood solution. Every now and then the solution can be centrifugally thrown from the sides to the bottom of the bottle by a quick swinging motion, which allows a new surface to be formed and aids in reaching equilibrium.

When the equilibrium has been finished, the solution is poured into a test-tube, the tannic-pyrogallic acid added, and the determination of carbon monoxide-hemoglobin made according to the procedure already described.

To test the accuracy of the method, synthetic carbon monoxide-air mixtures varying from 0.01 to 0.15 per cent were carefully made by volume, and 150 c.c. samples were taken for blood analysis, and some of the higher percentages for combustion analysis by the Haldane method. The blood analyses were run in triplicate, using blood from a different subject for each. Observations as to the amount of carbon monoxide-hemoglobin were made by three men—one experienced, and two inexperienced—the latter having no knowledge of the origin of the sample. Since this test for accuracy was made the method has been used continuously as a check

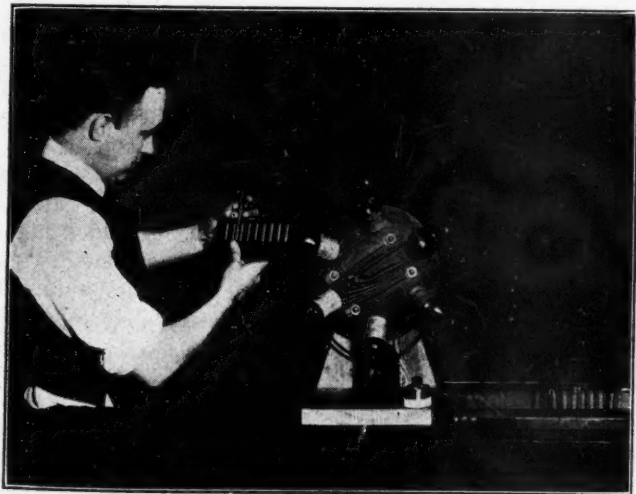


FIG. 3—MATCHING SAMPLE WITH SCALE OF COLORS

An experienced man can readily place the sample where it belongs and so ascertain the approximate percentage of carbon monoxide in the blood being tested.



FIG. 4—EXTRACTING BLOOD WITH THE HEMOSPAST

Blood is taken from normal men for use when a test is to be made to find the percentage of carbon monoxide in the air. It will be noted that a rubber tube is entwined around the subject's finger so as to put the blood under pressure and cause it to pass more readily into the hemospast.

on the carbon monoxide found by analysis of mine and tunnel atmospheres and the products of combustion from gas stoves, by the Haldane combustion apparatus, and in all cases the results have been satisfactory.

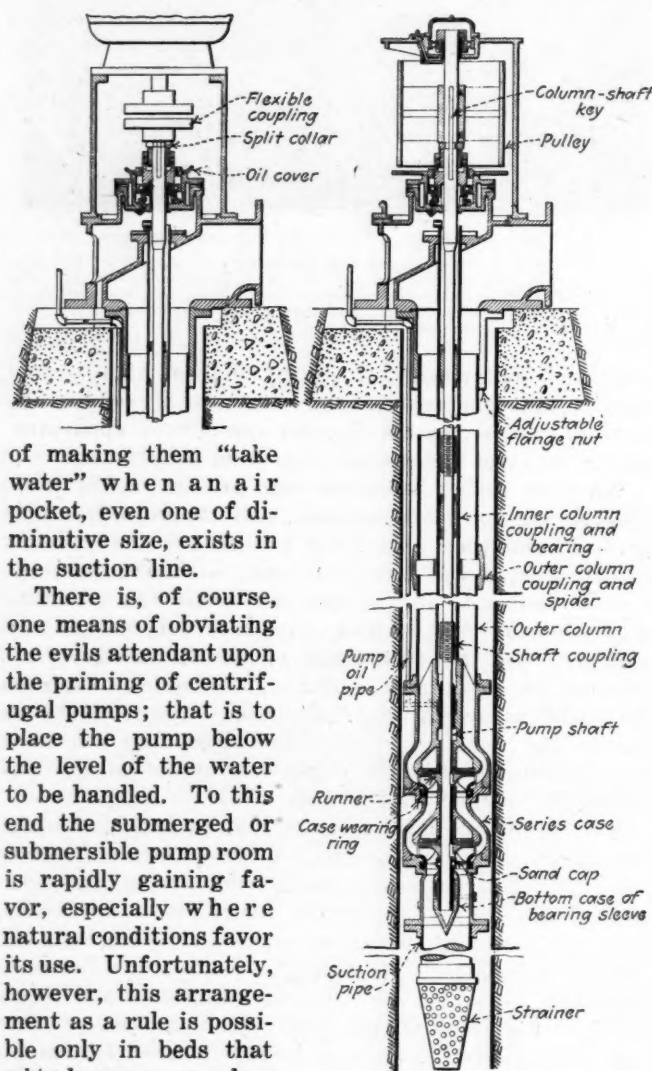
When no carbon monoxide was present out of mine observations, on three samples, only one reported it as present, and then only 0.005 per cent. The greatest error reported was 0.005 per cent, with 0.01 per cent carbon monoxide in the gas, excepting one observer who reported 0.00 carbon monoxide for one of the samples. As the percentage of carbon monoxide increased, the error also increased, as would be expected from the nature of the dissociation curve; but in all events the results obtained are within the limits of error allowable from the standpoint of the purpose for which the method was devised.

To sum up the matter: (1) A durable and compact laboratory or field apparatus for the quantitative determination of carbon monoxide in blood and air has been described. On account of the compactness, durability, and the ease with which accurate and dependable results can be obtained, it should be of great use in investigations pertaining to the cause, diagnosis and treatment of carbon-monoxide poisoning. (2) the percentage saturation of carbon monoxide in blood can easily be determined to an accuracy of 5 per cent. (3) The accuracy of the method for determination of carbon monoxide in air, even when used by inexperienced men, was found to be 0.005 per cent in regions of 0.000 to 0.05 per cent carbon monoxide; 0.01 per cent in regions of 0.05 to 0.08; 0.02 per cent in regions of 0.08 to 0.12, and 0.03 per cent in regions 0.12 to 0.18 per cent carbon monoxide.

COAL-PREPARATION STUDIES.—Thomas Fraser, assistant mining engineer, and H. F. Yancey, assistant chemist, attached to the Central District experiment station of the U. S. Bureau of Mines, Urbana, Ill., have completed a series of experiments on the cleaning of central Illinois coal screenings. A report on the subject has been prepared. Messrs. Yancey and Fraser have determined the forms of sulphur in the products obtained in washing tests on central Illinois screenings. The results show this coal to be high in finely disseminated pyritic sulphur as well as in organic sulphur. Work has been undertaken on samples of coal from Wyoming to determine whether it is amenable to improvement by the dry table cleaning process.

Deepwell Pumps Adapted to Mine Drainage; Submergence a Favorable Condition

OF THE many problems connected with mine drainage that of priming the pumps unquestionably is one of the most troublesome. This is particularly true of centrifugal machines. Priming a pump, as a rule, is not a difficult or expensive operation. It is, however, a vexatious one. Furthermore, everyone that has had experience with pumps of this kind knows the difficulty



DEEPWELL PUMP

This pump relies on the principle of submergence, the water standing in the impellers when the pump is not running.

of making them "take water" when an air pocket, even one of diminutive size, exists in the suction line.

There is, of course, one means of obviating the evils attendant upon the priming of centrifugal pumps; that is to place the pump below the level of the water to be handled. To this end the submerged or submersible pump room is rapidly gaining favor, especially where natural conditions favor its use. Unfortunately, however, this arrangement as a rule is possible only in beds that pitch more or less steeply, such as those of the anthracite region and the mountain states of the West.

A type of pump that has been used to an appreciable extent in other industries and which overcomes the difficulty of priming has more recently found a place in the coal mines. This is known as the Byron Jackson deep-well turbine pump, made by the Byron Jackson Iron Works, of San Francisco, Calif. This pump is of the vertical-shaft type and is driven either by belt or direct by vertical motor. This arrangement allows almost any distance to intervene between the motor or pulley and the pump.

As a result the machine may be installed in a shaft with the pump submerged within the sump and the driving motor well above high water; or the pump may be placed in a borehole and the motor installed on the surface. Again the pump may be placed in a sump in

one bed while the motor may be installed in a bed above, the shaft extending downward either through a borehole, a winze or an upraise.

Any one of the arrangements outlined possesses certain obvious advantages. Not only is the pump always submerged so that it is certain to take water immediately upon starting but the motor always is high and dry, where it will never be in danger of being flooded. In case the motor is placed on the surface and the water is discharged through a borehole the motor is in such a position that it can be cared for in a proper manner and be given the same kind of attention that is bestowed upon the rest of the surface equipment. Furthermore, when this arrangement is adopted the motor is not subjected to the dampness of the mine atmosphere.

Choosing a Permissible That Will Produce A Large Percentage of Lump Coal*

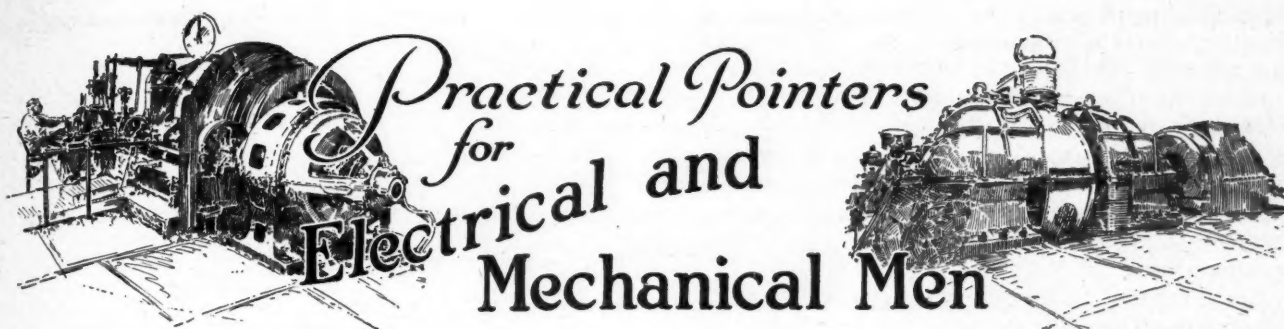
BY CHARLES S. HURTER

EXPOSIVES users tend to inquire first as to the relative quickness of an explosive when they wish to break up material into large pieces, for they fear that an explosive that has a high rate of detonation will shatter that material, but it has long been known in rock work that the size of the product is governed by the strength per cartridge quite as much as by the quickness of the explosion. In tight work some dense, comparatively slow explosives have produced as large material as lighter and quicker explosives, because the charge, being held in, is enabled to gain its full strength before the material to be blasted gives way. Consequently its deficiency in quickness does not act to its disadvantage. On the other hand, a light, quick explosive has produced coarse-sized material when, by reason of its being relatively light, it is distributed over a greater length of hole. Hence there is not the explosive strength per foot of charge to give the smashing effect.

These principles apply also to blasting coal. Therefore in studying the Bureau of Mines list of permissibles to choose an explosive for producing lump coal, not only "Velocity of Detonation" but also the "Unit of Deflective Charge" (strength) and the "Weight of a 1½x8-in. Cartridge" should be considered. The unit of deflective charge is the weight of explosive, in grams, equal in strength to ½ lb. (227g.) of 40-per cent straight nitroglycerin dynamite. This will make up into a cartridge about 1½x8 in. Thus, the lower the figure in this column, the greater the strength of the explosive. With a given unit of deflective charge the lighter the cartridge, the less its strength and the more cartridges per case.

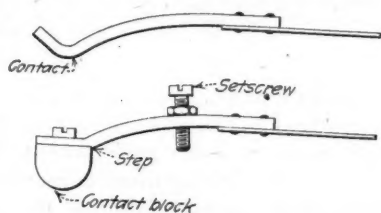
Even though an explosive has a low unit of deflective charge—that is great power per unit weight—and a high velocity of detonation, it will produce good lump coal if the weight of a 1½x8-in. cartridge is low. This has been shown conclusively by the results obtained with the newer types of ammonium-nitrate explosives having a large number of cartridges per case. The cartridge or bulk strength of an explosive is of great importance in the production of lump coal from thin beds where the coal is undercut. When the strength and density are about the same, then the explosive having the lower velocity will probably produce the larger percentage of lump coal.

*From the DuPont Magazine.



Economy in Controller Maintenance; Repairs to Fingers

WITH production costs at the present high level, maintenance charges have to be kept at a minimum, and any suggestions with this object in view deserve consideration. Controllers for regulating the speed of motors in mines have to withstand exceptional usage. In addition to ordinary fair wear and tear, electrical apparatus generally is exposed to careless treatment, which in the case of controllers often leads to serious burning of contact fingers and drum segments. This involves frequent repairs and renewals. Makers usually are prepared to supply spare fingers and contacts, but much of this expense can be saved by making the spares at the mine and where necessary altering contact fingers so that repairs are facilitated and efficient operation maintained at a low cost. The upper portion of the figure shows a typical contact finger fitted to large numbers of controllers.



STANDARD FINGER AND
ADAPTED FINGER

Burning tips attached to the standard finger cut down the maintenance cost of controllers. Contact blocks may readily be renewed or the finger adjusted.

It is obvious that when the contact portion becomes badly burned, the whole finger has to be scrapped. Moreover, during service the finger either must be filed in position or it must be entirely removed for the purpose. The first method is objectionable because of the filings getting into the oil in oil-immersed controllers, and causing short-circuits. Further, it is very difficult to file away the burnt surface with the finger in position. Taking out the finger often involves the removal of two small screws, which usually are difficult to replace because of the spring in that portion of the finger which supplies the tension when it is screwed home. Both time and money can be saved by fitting the fingers with contact blocks as shown in the lower part of the figure. Fingers that are not too badly worn can easily be altered and spares might be fitted with blocks ready for inserting in the controller when required.

The method of fixing the contact blocks is clearly shown in the figure, which is almost self-explanatory. The contact finger to be altered should be heated and the end flattened. Then it should be filed to form a step toward the heel against which the contact block rests when held in position by its screw. This prevents the block turning in the event of the screw becoming loose. The blocks can be cut from square copper bar

which in lengths of, say, 1 ft. or 12 in. have been shaped in the machine shop. The bars should be marked off, drilled and tapped before being cut into blocks. Afterward they should be fitted to a standard finger so that they will be interchangeable. The fingers too should be made to a standard, for the same reason.

To allow for adjustment each finger should be provided with a set screw and a locknut, so that as the blocks wear, the fingers may be lowered to keep the contact portion of all blocks in perfect alignment. The block should be held in position by cheese-head screws, and if found desirable they may be fitted with locknuts. The advantage of these interchangeable blocks is that each controller can be provided with a spare set to replace those taken out for repairs. The block can be changed quickly, those taken out being filed up in spare time ready for replacing when further repairs are necessary. For controllers doing heavy service, allowing only short periods when repairs can be done, these block contacts are very convenient.

R. F.—E.

A Simple Explanation of Dynamic Braking And Dynamic Lowering

RECENT developments in controllers for small hoists and mine locomotives have proved that dynamic braking and dynamic lowering are both economical and very practical. Economical because the wear and tear of brake shoes and brake rigging especially on mine locomotives is reduced to almost nothing. Practical because controllers are now designed which can be installed with very little extra cost and operated with very little extra maintenance and the number of repair parts hardly more than were required with the old type of controller.

Dynamic braking and dynamic lowering are not or and the same thing although both are mistaken one for the other. Dynamic braking, which is a system of braking whereby the load is actually retarded, is obtained by shunting a resistance around the armature and series field, making in fact a series generator, as shown in Fig. 1.

This connection will retard the load —i.e., slow up the

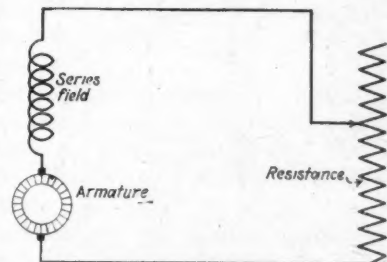


FIG. 1—CONNECTIONS FOR
DYNAMIC BRAKING

With this arrangement of the circuit the series motor is used as a series generator, thus creating a counter torque to that of the descending weight. The series generator is loaded by means of the usual control resistance, which may be varied by the controller. When the armature stops, the counter torque of the generator is zero; therefore it is necessary to apply a mechanical brake to hold the descending weight at rest.

speed to a point where the current generated in the armature exerts a torque that is just sufficient to balance the load. This speed at which the load will be held constant is a function of the grade and the weight. Any increase in speed now would increase the current, which in turn would increase the torque, thus exerting a greater retarding effort. Any decrease in speed would decrease the current generated in the armature and consequently decrease the torque, exerting a smaller braking effort.

The foregoing is for any given value of resistance inserted in series with the armature. As mentioned in the preceding paragraph, for any particular grade and weight and with a particular value of resistance inserted in series with the armature there is a definite speed at which the load will move. With these same conditions of weight and grade the speed can be varied by increasing or decreasing the amount of resistance. Controllers are designed to do this and the maximum braking will occur when the armature is short-circuited through the series field and the minimum amount of braking will occur when the maximum resistance is placed in the circuit—that is, on open circuit. One thing must be noted and that is that when the armature stops revolving the braking effort is entirely lost. It is evident then that to bring the load to a standstill the mechanical brakes must be applied.

Dynamic lowering is a term applied to a system of retardation or the holding of the load at any given speed desired regardless of the conditions of grade or size of load. This is accomplished by making a shunt generator out of the motor and connecting it across the line. It will be well to note here that dynamic braking is applied on locomotives mostly, while dynamic lowering or a combination of the two is used on hoists. An understanding of dynamic lowering can be obtained from Fig. 2, which is a schematic diagram of a hoist controller which in the off position of the controller handle gives a dynamic braking connection and in other positions of the lowering position dynamic lowering. Fig. 3 is the actual connection diagram of the controller.

Referring to Fig. 2, in lowering, starting from rest the load will speed up as soon as the mechanical brakes are released and will be held automatically constant at some definite speed. Moving the controller handle now

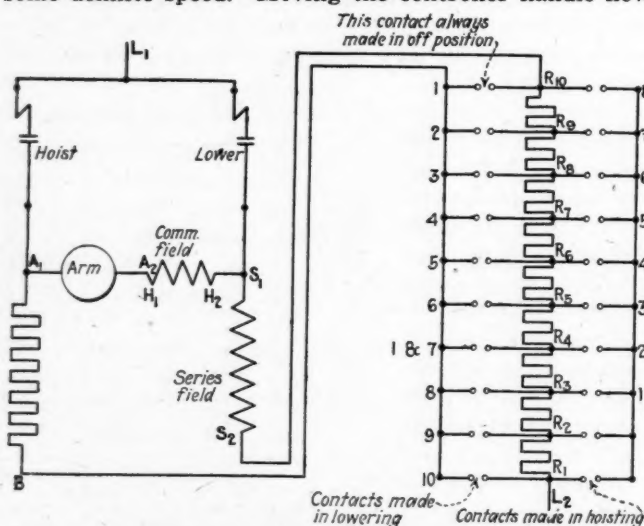


FIG. 2—SIMPLIFIED DIAGRAM OF A DYNAMIC BRAKING AND DYNAMIC LOWERING CONTROLLER

Most hoist controllers are arranged to give dynamic braking for making a stop and dynamic lowering for regulating the speed of the descending weight.

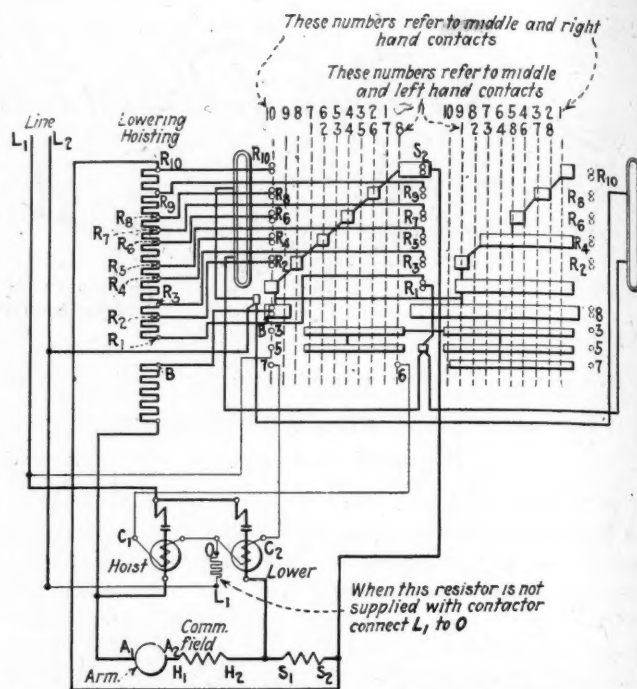


FIG. 3—TYPICAL DYNAMIC BRAKING AND LOWERING CONTROLLER

These controllers give ideal control of the load and aside from making the operation easier, permit safer handling and subject the equipment to less mechanical shocks and jars.

to the first notch, lowering, closes the main-line contactor and closes contact fingers 1 and 7 in the controller. This makes a shunt generator connected across the line. A condition of maximum current is now attained in the field. The second notch on the controller in lowering closes contact finger 2 in the controller, which weakens the field, allowing the load to speed up. Then closing successively fingers 3 and 4, etc., the motor speeds up until maximum speed is reached and contact finger 10 within the controller is closed. To retard the load the controller is swung to the off position, which, as before mentioned, makes a series generator short-circuited through a resistance. The motor slows down and finally the mechanical brakes are applied to bring the load to rest. Analysis of the diagrams will show that the wiring installation is no more complicated than with other types of controllers.

O. E. KENWORTHY.

Wilkes-Barre, Pa.

Useful Table for Construction Work

THE more general housing of electrical equipment in concrete or otherwise fireproof buildings frequently requires the drilling of holes for attaching equipment. I therefore wish to submit for publication the following table showing the dimension of drills to be used with expansion bolts which will no doubt prove valuable:

Diameter of Bolt	Diameter of Drill	Diameter of Bolt	Diameter of Drill
$\frac{1}{4}$ in.	$\frac{3}{8}$ in.	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.
$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	$\frac{3}{4}$ in.
$\frac{1}{2}$ in.	$\frac{3}{4}$ in.	$\frac{3}{4}$ in.	$\frac{1}{2}$ in.
$\frac{5}{8}$ in.	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.	$\frac{1}{2}$ in.

A. J. KELLEY,
Construction Foreman.

UNFORTUNATELY, AN INTELLIGENT MINORITY doesn't always stay that way after it becomes a majority.—
Chicago Journal.

Will Pulverized Coal Be Substituted for Fuel Oil in Smelting Operations?*

Freight Rates and Number of Heat Units Big Factors in Comparing Fuels—Pulverized Coal Has Higher Thermal Efficiency Than Mine-Run—Cheap Electrical Power from Water-Power Developments May Compete with Fuel Oil and Coal

By T. H. O'BRIEN

General Manager Inspiration Consolidated Copper Co.

CONSIDERATION frequently has been made of late by a large number of copper smelters of the advisability of replacing fuel oil with pulverized coal as a heat-producing medium for smelting operations. This matter has been, and is more so now than at any time heretofore, of great importance. Due to the intensive development of oil-producing areas of the world and the tremendous use of fuel oil for many purposes it seems that before many years the supply of oil will become so small as to prohibit its use for such operations as smelting. This may be caused by prohibitive prices, or even by government regulations as a conservation measure.

In the event that the use of fuel oil becomes out of the question, the copper companies have just two alternatives: the use of pulverized coal or electricity.

There is no doubt whatever that the consumption of copper is going to increase, perhaps for the next ten years. This means that more copper mines will be developed, and the mines that are now producing will be called upon for a greater production. This all tends to show that the mine manager who is looking ahead must develop some substitute for fuel oil in the event of its use becoming prohibitive, and all indications seem to point in that direction.

The only coal which is commercially available to the smelters in the Southwest must come from Colorado and New Mexico. These coals are high in ash and volatile matter and comparatively low in calorific value.

DISTANCE FROM MINES AN ECONOMIC FACTOR

The proximity of the smelter to the coal mines is a large factor in determining which fuel is more economical. Most of the smelters within two or three hundred miles of the coal mines find it more profitable to burn coal, while those at greater distance find that the higher freight charges on coal make the use of oil more economical.

The use of pulverized coal entails a much greater initial expense than does the use of oil. A small pulverizing plant is far from economical. There have been a number of small individual units put on the market in the last few years, but they have not been very successful either in the product which they have delivered or from the standpoint of operating expenses. This fact nearly prohibits the small operator from using coal.

The freight rate on oil usually is less than on coal, also the tank cars are owned by the oil companies, and it is up to them to provide cars in sufficient number to handle their output, while in the shipment of coal one is dependent on the railroads for cars.

Heavy construction expense would be necessary in

changing the equipment of boiler plants from their present oil-burning system to a coal-burning system. In case the coal was not pulverized, overhead bins and mechanical stokers would be necessary. Also, the available coals would not burn with a high efficiency over grates. The consumption of coal by reverberatory furnaces is 50 per cent greater than by boilers in the Southwest, and to obtain a reasonable efficiency the coal must be pulverized for furnace work.

In a large reverberatory plant the cost of preparation of the coal should not be over 75c. per ton. This would include such items as local switching, weighing, unloading, crushing to slack size, drying, pulverizing, conveying, feeding, etc. Local conditions might vary some of the above items materially. In some cases, drying might not be necessary and in others it might cause an excessive expense. Also ash removal in some plants might be very expensive, especially if the plant were not built for powdered-coal burning.

EXPENSIVE ASPECTS OF COAL AS FUEL

Due to the uncertainties caused by possible labor and railroad strikes, it would be imperative for the copper companies to carry large stocks of coal, with the consequent heavy interest charges and constant danger of fire and deterioration.

Grinding and drying costs on coals high in ash and moisture are high. The freight charges on non-combustible materials would be a considerable item on these coals. Thermal efficiency on high-ash coals is greatly increased by pulverizing.

After a coal is satisfactorily pulverized and delivered to the burner, the regulation of the heat is as easy with coal as with oil. Coal in a powdered form is about as combustible as gasoline, and constant care must be used in its storage. A coal-pulverizing plant must always be kept scrupulously clean and dust in the atmosphere kept at a minimum. Even with the greatest precaution, there always is constant danger of disastrous explosions.

The cost of local switching, measuring, pumping, heating, atomizing and maintenance of fuel-oil equipment will range from 10c. to 20c. per barrel of oil, with an average of about 13c. in a large, well-managed plant.

Therefore, coal containing 10,000 B.t.u. per pound and selling at \$2 per ton at the mine, with a preparation cost of 75c. per ton, will stand a freight charge of not to exceed \$3.80 per ton, in order to compete with oil at \$1.87 f.o.b. cars at point of consumption. Coal containing 12,000 B.t.u. per pound would carry a transportation charge of \$4.55 per ton.

With oil costing \$3 per barrel burned, or \$2.87 f.o.b. cars at point of delivery, 10,000 and 12,000 B.t.u. coals would have an even break at a cost in the furnace of \$9.70 and \$11.65 per ton respectively. With prepara-

*Paper read before Rocky Mountain Coal Mining Institute.

tion costs of \$1 and a freight charge of \$5 per ton, the price at the mine should not exceed \$3.70 and \$5.65 per ton respectively. The above costs do not include capital charges, taxes, etc.

In a new installation the cost of storage and handling equipment for coal would to some extent be matched by that necessary for oil, but in the event of changing the present equipment from oil to coal, the coal would of necessity be required to carry the capital charges in excess of the operating costs. Recent estimates give the cost of a coal-preparation plant of 500 tons daily capacity at about \$500,000. Assuming a ten-year useful life, the capital charge would amount to about 50c. per ton of coal.

It is quite probable that within the next ten years cheap electrical power will be available from the development of the Colorado River. Electrical smelting is not very far advanced in this country, but in some foreign countries, notably Sweden, it is used to a considerable extent. It is not inconceivable that by the time fuel oil becomes unavailable, cheap power and advanced methods will make electricity an active competitor of coal for smelting purposes.

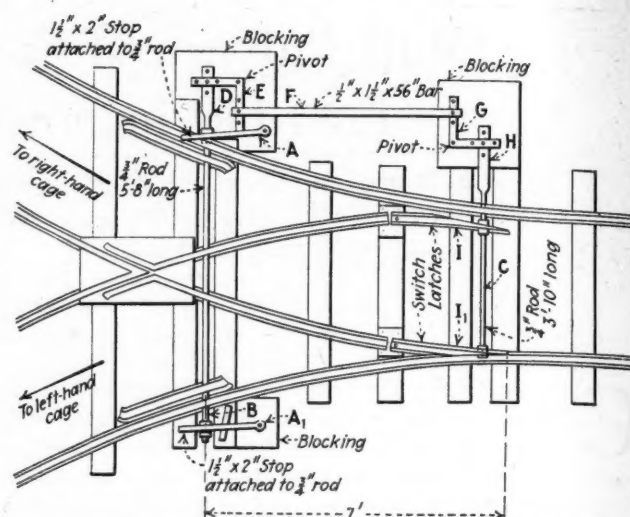
At the present prices of oil and coal delivered at any considerable distance from the mines, and the necessary cost of new construction for the use of coal, oil has a distinct economical advantage. Assuming that the cost of fuel oil increases to the point where the mining and metallurgical industries would discard it in favor of pulverized coal, the plants in the Southwest would require about 3,000 tons per day.

A Latch Which Passing Cars Reverse

AT THE foot of the Twin Shaft, Seneca Colliery, in the Marcy bed, is a switch operated by an ingenious device which by passing mine cars is manipulated in such a way that the cars are fed first to one shaft cage and then to another, the changes in the switch to that end being made entirely automatic. The mechanism was designed by D. J. Matthews, the inside foreman of the mine, the material from which it was made being gathered around the colliery and made up in the company's own shop. The device is described in a recent issue of the *Employees' Magazine*, published by the Lehigh Valley Coal Co.

When a trip of cars comes down the roadway the bottom cager, or "footman," sets the switch to guide the first car to either the right- or the left-hand side of the shaft, depending on which cage is at the landing. Let us suppose that the first car goes to the right-hand cage as denominated in the illustration. On its way the front wheels will strike the rail-riding latch, A, and force it off the rail. This will move the iron bar, B, toward the top of the page and pull the companion rail-riding latch, A₁, onto the rail. D, which is the flattened end of the bar, will move in the same direction and communicate that movement to the right-angle or bell crank, E, which accordingly will pull the rod, F, toward the mine shaft, thus tipping the bell crank, G, and moving the rod, C, through its flattened end, H, toward the top of the page. This closes the switch latch, I, and opens the switch latch, I₁, so that the next loaded car will go to the left-hand cage.

When another loaded car enters the switch and passes to the left-hand cage the front wheels push back the rail-riding latch, A₁, into the position shown in the drawing, and that shifts all the parts back into the



SWITCH DERAILS TRIP THAT TRIES TO ENTER SHAFT

When a trip of cars runs away on a heavy grade near the shaft bottom the automatic switch gets into action. Throwing the cars right and left it soon causes a derailment, preventing them from falling down into the sump.

first position, thus throwing the switch into place for the reception of a loaded car soon to be needed at the right-hand cage.

From the description of the operation of the device, it would seem that its purpose was to expedite the work of the footman. Though in a sense this is true, yet it was not the sole purpose Mr. Matthews had in mind when he installed the device. In fact, his prime reason was the safety afforded by its manner of operation. At that point in the Marcy bed a sharp pitch and curve leads down to the cages. There are times when the coupled trip is so heavy, consisting as it often does of as many as thirty-five loaded cars, that the car runner is unable to sprag the trip, the result being that it runs through the open side of the switch and plunges down the shaft. This was what frequently happened before the installation of the automatic rail-riding latch. While it is true that there is a safety block designed and installed to prevent such an occurrence, still the weight of, and the force expended by, these loaded cars when they strike the block is so great that the "stop" is practically useless in that it fails to prevent the cars from plunging into the shaft and doing much damage to themselves and other equipment. There are, of course, many other secondary losses attendant on such accidents.

With the device in operation, should a long trip of coupled cars get away from the spragger upon approaching the shaft, the first car will pass over the switch and throw it in the opposite direction. The second car then travels in a different direction from the first and in doing so throws the switch so that the third car attempts to take the same direction as the first car. As a natural result the trip is derailed, throwing the cars against the rib to the right and left, but preventing them from plunging down the shaft. The feasibility of this device has been tested on several occasions when a loaded trip of cars got away from the runner and in each instance the cars were prevented from getting anywhere near the shaft.

J. C. BRYDON, CHAIRMAN OF THE BITUMINOUS OPERATORS' SPECIAL COMMITTEE, on June 7 announced the appointment of E. L. Douglass, vice-president of the First Creek Mining Co., Cincinnati, Ohio, as a member of the Special Committee in the place of E. C. Mahan, president of the Southern Coal & Coke Co., Knoxville, Tenn., who resigned because of a serious accident which befell him recently.

Book Reviews

Machinery Foundations and Erection

Another book of the Power Plant Series, just published by the McGraw-Hill Book Co., 370 Seventh Ave., New York, N. Y., is of special interest to electrical and mechanical men in the coal fields, rapid expansion and change in machinery used around mining properties having created a demand for a text dealing with foundations and installation of equipment. The new volume is "Machinery Foundations and Erection," by Terrell Croft.

The material in the book is a compilation of practical and theoretical ideas that have proved successful. Considerable of the text has been obtained from a wide range of technical and practical engineering journals devoted to all the important industries of the country. Conspicuous among these are extracts from *Coal Age*, *Electrical World*, *Power* and *American Machinist*.

The subject matter covers the whole field of foundations from anchor bolts, through excavating and masonry to erection of machinery.

Powdered Coal—Its Preparation, Transportation and Combustion

MANUFACTURERS and operators of coal-fired furnaces will find facts which they cannot afford to disregard pointed out in Bulletin 217, U. S. Bureau of Mines, by John Blizard, a paper giving an account of the methods, advantages and disadvantages of preparing and burning powdered coal. They will do well if careful estimates are made comparing their present method of burning coal on grates with a system for pulverizing and burning it.

Several systems successfully used are explained in the bulletin. There also is a generous description of various types of pulverizers and furnaces, together with test data on typical installations using all kinds of fuel from lignite to anthracite.

Powdered coal has proved an economical fuel for steam raising, cement making, metallurgical furnaces and many other purposes. For steam raising, with a properly constructed boiler and furnace, a continuous efficiency of over 80 per cent may be maintained.

A Ready Reference in Material Handling

AN EXHAUSTIVE compilation of definitions, descriptions, illustrations and methods of the use of material handling machines employed in our industries is contained in a book entitled "Material-Handling Cyclopedic," recently published by the Simmons-Boardman Publishing Co. It is divided into three sections; the definition section, illustrated section, and catalog section.

In the definition section are defined devices, accessories and terms used in material-handling machines which may be broadly classified as hoisting equipment and transportation equipment.

The illustrated section shows typical and special applications of various kinds of material-handling machines in a large group of industrial enterprises.

The catalog section gives specific information regarding the products and services of a large number of the leading manufacturers of such equipment.

As a book it is truly a cyclopedia for ready reference on any problem of material handling and no doubt will find a prominent place in the files of the managers and engineers of the industries.

Index to Proceedings of American Society For Testing Materials

THIS is a subject and author index of papers and discussions before the American Society for Testing Materials, of 1315 Spruce Street, Philadelphia, Pa.

The arrangement of the material gives ready access to such topics as belting, bearings, corrosion, wood preservatives, etc.; all of which are of vital interest to engineers and purchasing agents in the coal fields.

The subject matter of the articles referred to in the text is rapidly becoming authoritative and more generally used, thus creating a heavy demand for copies of the index.

Explosives and Equipment in Coal Mines

TECHNICAL Paper 333 of the U. S. Bureau of Mines has just been issued. It contains a table giving the brand names of all explosives now considered as permissible for use in dusty and gaseous coal mines, tested by the Bureau of Mines prior to Jan. 1, 1923. The list includes a total of 154 permissible explosives. In addition Technical Paper 333 includes lists of permissible explosion-proof coal-drilling and shortwall-mining equipment, permissible electric lamps, permissible flame safety lamps, permissible methane indicators, single-shot blasting units, storage-battery locomotives, mine-rescue breathing apparatus, and gas masks. Co-operation of the operator in maintaining the various lines of apparatus listed in a safe condition is earnestly solicited.

DESIGN OF FURNACES FOR BURNING POWDERED COAL.—Furnaces in which powdered coal is to burn must be large enough, and be correctly shaped, so that the coal may burn completely without impinging on the brickwork, and must be provided with facilities for removing the ash, states the Department of the Interior in Bulletin 217, just published by the Bureau of Mines. If the furnace is correctly designed, about 3 B.t.u. per second may be liberated per cubic foot of combustion space. This rate of combustion is sometimes exceeded, but if it is much exceeded the coal will not be burned completely. In many furnaces the temperature is so high that the ash fuses, and on settling in the furnace collects in a continuous mass. It has become expedient in some furnaces to cook the ash before settling and so prevent it collecting in a continuous mass, though generally this is not done, and the ash collects either on the hearth, whence it is removed when the furnace shuts down, or it is removed as a liquid slag. The ash that does not settle in the furnace goes off with the gases, and care must be taken to see that it may not be deposited in the flues and so impede the draft. When a furnace previously heated by coal burned on a grate, gas, or oil is to be transformed into a powdered-coal fired furnace, the furnace may or may not have to be modified in design to suit powdered coal. Except for boiler furnaces, very radical alteration of design is unusual. At most, the change consists usually in enlarging the furnace. But no furnace should be fired with powdered coal without the advice of experienced engineers, who will either approve the application of powdered coal to the furnace as it exists or carefully redesign it so that it may be economically operated with powdered coal, using the best means of disposing of the ash.



Problems of Operating Men

Edited by
James T. Beard



Use of Water Gage in Estimating Power on the Air

Correct Position of Water Gage to Indicate Total Energy of Air Current—Sum of Velocity and Static Heads Determines the Power on the Air

RREADING the interesting article entitled "Developments in the Theory of Centrifugal Fans," by Henry Briggs, professor of mining, Heriot-Watt College, Edinburgh, Scotland, which appeared in *Coal Age*, April 12, p. 601, I fail to understand how the position of the water gage shown in Fig. 3 (a), p. 602, is correct, when estimating the power on the air.

In the position shown in that figure the end of the tube connected with the water gage is bent at right angles and turned to face the current. It is evident that the reading of the gage, in that case, will indicate the combined velocity and static heads, instead of showing the static head only, as indicative of the pressure producing the circulation in the airway. As I understand it, this is the principle on which all flow meters are designed, and I would ask, "How can the meters record the flow if the method here shown is correct?"
Cresson, Pa.

ELECTRICAL ENGINEER.

The letter of this correspondent was submitted to Professor Briggs, who replied, in substance, as follows:

The meaning of the point raised by the correspondent is not clearly defined, and in attempting to reply I beg to refer to the accompanying sketches, which I hope

has for its purpose ascertaining only the velocity of the current by measuring the velocity head only.

The principle of the flow meter is clearly shown in Fig. 1, where a water gage is connected with two tubes, A and B. The end of the tube A is bent at right angles and turned to windward, in which position it is exposed to the combined velocity and static pressures concerned in the flow. On the other hand, the end of the tube B is arranged normal to the current and is subject to the static pressure only. It is evident that, by this arrangement, the reading of the water gage will indicate the difference in these two pressures and represent the velocity head only from which the velocity of the current is ascertained.

WATER GAGE TO INDICATE ENERGY OF CURRENT

Now, in dealing with the subject of mine ventilation and the theory of centrifugal fans, discussed in my article to which reference has been made, it is necessary to obtain a water-gage reading that will represent the energy of the current, as determined by the product of the velocity and pressure.

To make the situation more clear, allow me to refer to Fig. 2, which represents an airway of varying cross-section. As indicated by the arrows, the ventilation is from left to right, and I have assumed an average sectional area of the airway at the extreme left; a contracted area at the center, and an expanded sectional area at the extreme right of the figure. Now, ignoring, as we may, the frictional resistance between these nearby points, it is clear that the power on the air, or the energy of the current, is the same at each of these stations.

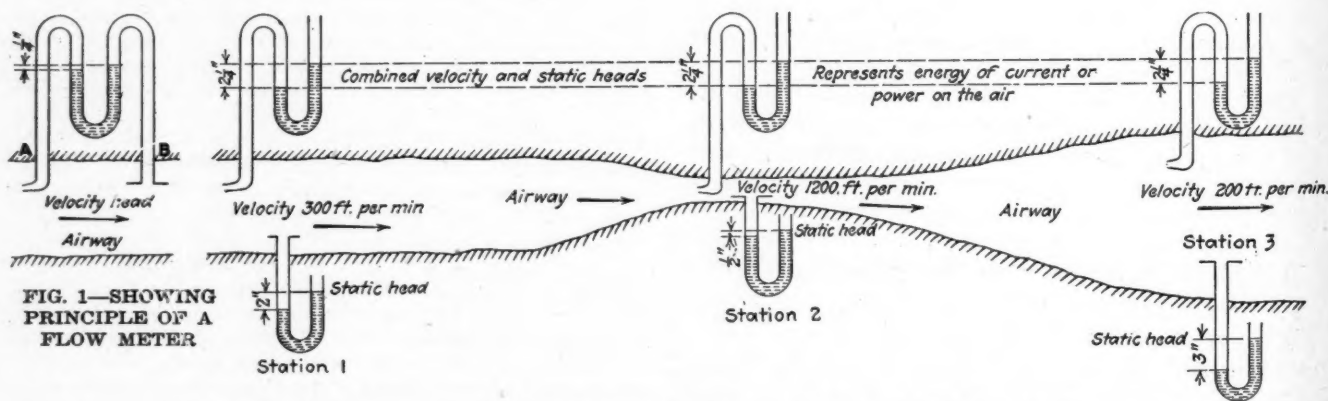


FIG. 2—SHOWING EFFECT OF CHANGE IN SECTIONAL AREA ON WATER-GAGE READING

will make clear the use of the water gage in estimating the power on the air flowing in an airway.

Our friend's difficulty, it seems to me, is that he has failed to comprehend the purpose for which the water-gage reading is taken, in this case. What is desired is to estimate the energy responsible for the flow; or, as we say, the power on the air. This is a different proposition from that involved in a flow meter, which

On the other hand, for a constant power, as the velocity is increased at Station 2, by reason of the contracted area at that point, the static pressure is correspondingly decreased. Again, at Station 3, where the area is much enlarged, the velocity falls and the static pressure is correspondingly increased.

The three water gages shown above the airway, having the ends of the tubes bent to windward in each case,

give a constant reading, regardless of the sectional area of the airway, as indicated by the dotted lines showing the height of the several water gages. On the other hand, the three gages shown below the airway each give a reading that varies with the sectional area of the airway at the point where the reading is taken. These results can be verified by actual trial. In each case, the difference between the upper and the lower reading, at each station, gives the velocity head for that station. In the figures introduced this velocity head is assumed to be $\frac{1}{2}$ in., while the normal static head is taken as 2 in. The latter falls to $\frac{1}{2}$ in. when the area is contracted and rises to 3 in. where the area is expanded.

In conclusion, let me express the hope that I have made it clear that the correct position of the water gage, for the purpose of ascertaining the power on the air, is as shown in the upper portion of Fig. 2, having the end of the tube facing windward, so that the reading will record both the velocity and the pressure head. Where the end of the tube connected with the water gage is arranged normal to the current, as in the lower portion of the figure, the reading of the gage will indicate the static pressure only. Finally, the difference between these two readings will represent the velocity head, as indicated by the arrangement shown in Fig. 1, which is common to the flow meter.

Edinburgh, Scotland.

HENRY BRIGGS.

Coal Brokerage vs. Sales Agencies

Brokerage of coal not economic—Increases cost to consumer—The Broker not a salesman—Eliminate unnecessary transactions to reduce cost to consumer.

PARDON me for referring again to the question of brokerage in the coal industry. My previous article was with the express object of concentrating attention upon a class of business that serves no economic purpose, as I view the matter. Exception has been taken, by M. R. Atkinson, *Coal Age*, March 22, p. 493, to my classing the average coal broker as a parasite on the coal business, although he admits that there is a class who will rightly come under that appellation.

It is clear that the profit derived in the brokerage of coal represents either a reduction in the legitimate profit of the producer, or an increase in the cost of coal to the consumer. Almost without exception, the latter of these two alternatives is the result when the product must pass through the hands of a broker before it reaches the consumer.

Despite the claims urged by Mr. Atkinson in justification of coal brokerage, the simple fact remains that the more complex the nature of the transaction, the higher will be the ultimate cost of the product.

APPLYING AN OLD AXIOM

By way of analogy, let me make mention of the mathematical axiom; namely, "A straight line is the shortest distance between two points." Nothing can be more simple than the application of this axiom to the transactions involved in the transfer of a commodity from the producer to the consumer. Each additional transaction adds its quota to the final cost of the product.

Now, the only justifiable excuse that can be offered for the existence of an intermediary between the producer and the consumer must be of a nature that an actual economy is effected through such agency. It must be shown that the same economy cannot be realized

in a direct transaction that involves the two principal parties only.

In his defense of brokerage, Mr. Atkinson has suggested that the coal broker relieves the operator of the necessity of establishing and maintaining an organization for the sale of his product. This would class the coal broker as a salesman acting, perhaps, in the service of numerous producers.

SALES AGENCIES A LEGITIMATE BUSINESS

Selling through agencies is a legitimate method of business, and there should be no occasion to question the propriety of its application to the marketing of coal through brokers if their activities are confined strictly to transactions of that nature.

It is well known, however, that a large portion of the business of the average coal broker is on a false basis, the broker assuming the position of producer, on a relatively small investment. Acting in this assumed capacity, a large class of brokers purchase and resell products many times in advance of production.

It is my contention that this class of brokers are nothing less than speculators whose business is illegitimate and whose activities are harmful to the coal industry. In other words, they are parasites on that industry.

Another claim made by Mr. Atkinson incidentally, though with much emphasis, is that the coal broker is in a position to assist the operator in financing his payroll and stating that this "is not the least portion of his service." The suggestion naturally implies that the coal broker is more than a salesman—he becomes an investor, a speculator; and the ability to do this presupposes a degree of control of the operator's business, in which the broker becomes a co-partner.

EFFECT OF MARKET CONTROL BY AGENTS

It is interesting to surmise what such a control of the marketing of coal means to the general public and the individual consumer. Can it be expected that it will involve any tendency to the lowering of the price of coal to the consumer? Can it be claimed that the activities of brokers such as I have described are anything else than harmful? Certainly, the conditions are not those that would result from legitimate sales agencies. Therefore, I claim that the average coal broker is not a salesman.

In closing his letter, Mr. Atkinson says that had I carried out my logic to its rightful conclusion, I would have made the operators retailers of their own coal. Let me say that, with the exception of a domestic mine, the operator sells his coal in carload lots. Therefore, while he may and should sell to such customers as are able to handle coal by the carload, he cannot be classed as a retailer, under the usual accepted meaning of the term.

As a matter of economy, and a stimulant of trade, allow me to repeat that all products should reach the consumer at a minimum cost. It is to be hoped that the present Coal Commission will thoroughly investigate the channels of trade and eliminate all unnecessary transactions and devious methods in the handling and marketing of this necessity of life. If coal brokers create a direct channel by which the coal reaches the ultimate consumer, their business is legitimate and economical; if not, that fact should be positively ascertained and their business set aside.

Washington, D. C.

I. C. PARFITT.

Explosion Results from Stoppage of Fan

Fatal mine explosion points to faulty ventilating equipment—Fan stops when electric current fails—Explosion occurs when fan is again started.

ALLOW me to express my deep feeling, after reading the brief account of the deplorable accident, recorded in *Coal Age*, May 10, p. 768, as having occurred in the Southwestern Mine of the Rocky Mountain Fuel Co., at Aguilar, Colo., May 5, causing the death of ten men at work in the mine. Had this not been an idle day the loss of life would have been greater.

The report states that investigation showed the electric current operating the fan had failed and the fan was stopped for fifteen or twenty minutes. It was during this interval, or when the fan was again started, that the explosion occurred. To my mind, this seems a very strange occurrence and points plainly to the fault of the management in failing to provide safe equipment for the ventilation of a gassy mine.

While the account does not state whether this was a gas or a dust explosion, it may be assumed that gas had accumulated, at some point in the workings, while the fan was stopped and that this body of gas was ignited either by the sparking of a live wire or other possible cause. Perhaps a booster fan, inside of the mine, was the immediate cause of the disaster; but this is only a surmise on my part.

Assuming that the mine was generating considerable quantities of explosive gas, safety would require that the fan producing the ventilation should be capable of continuous operation. Safety would have suggested providing duplicate fans for that purpose. The fact that this fan was electrically driven introduces another element of danger, due to the possible failure of the current and the stopping of the fan at any moment.

STEAM POWER AND DUPLICATE FANS SAFER

In respect to safe ventilating equipment for a gassy mine, my preference would be to provide duplicate fans operated by steam power, which is more reliable for continuous service than electric current, whether purchased or supplied by the power plant at the mine. My belief is that this is the only reliable source of uninterrupted service, which is the predominant feature in the ventilation of a mine generating gas.

Aside from failing to provide safe ventilating equipment, which seems to be largely responsible for this dread occurrence, allow me to state that the mine management made a still greater mistake in not withdrawing the ten men who were entrapped by the explosion and lost their lives, and the three other men who barely made their escape from the mine. All will agree that these men should have been notified at once when the current failed and the fan was stopped. They should have been ordered to come out of the mine, which is probably required by the mining law of the state. (Colorado Mining Law, Sec. 50.)

In closing, let me say it would be of great interest to know the full details of this explosion, and understand to what extent precautions were taken to avoid such a disaster, and whether the safety rules and regulations were strictly enforced in the mine. No doubt a thorough investigation has been made, or will be made, to determine the responsibility for the occurrence. Only by that means can we increase the safety of mining operations.

Wilder, Tenn.

OSCAR H. JONES,
District Mine Inspector.

Inquiries Of General Interest

Calculating Theoretical Grade in Economic Mine Haulage

Economic Grade Dependent on Gravity System—Gravity of Loaded Cars, Less Track Resistance, Equal to Sum of Grade and Track Resistances of Empties

WE HAVE had a number of arguments regarding the method of calculating the grade of a main haulage road, in a mine, such that the same power will be required to haul the loaded and the empty cars or trips, respectively. We are asking that this question may be answered in the columns of *Coal Age*, assuming that a single car is hauled at a time, the weight of the empty car being 1,000 lb., and its weight when loaded 3,000 lb. Also, assuming a track resistance of 15 lb. per ton.

My contention is that the ratio of the weight of the loaded car to that of the empty is equal to the ratio of the sum of the track and grade resistances to their difference, which gives the proportion.

$$3,000 : 1,000 :: 15 + 20x : 15 - 20x$$

In this proportion, x represents the per cent of grade. The grade resistance per ton, for each per cent of grade being 20 lb., makes the total grade resistance for the ascending car $20x$, which is also the gravity pull of the descending car. Finding the value of x from the above proportion gives a grade of $x = \frac{3}{4}$ per cent, which some claim is wrong.

Pittsburg, Kan.

STUDENT.

In calculating the theoretical grade for economic haulage, it is true that the ratio of the weight of the loaded car to that of the empty is equal to the ratio of the sum of the track and grade resistances to their difference, approximately, ignoring some minor considerations. This being a question of the power required to haul a loaded car, on a certain downgrade, being equal to that required to haul the empty car up the same grade; and the power being proportional to the weight of the moving load and the net resistance, in each case, we can write the equation

$$3,000(15 - 20x) = 1,000(15 + 20x)$$

The problem assumes that the grade is in favor of the loaded cars, and the track resistance of the downgrade is then offset, in part, by the gravity of the loaded car; while, on the upgrade, the track resistance of the empty is increased by the grade resistance. The solution of this equation, expressing the equality of power in the two cases, gives for the value of x , or the percentage of grade,

$$80x = 30; \text{ or, } x = \frac{3}{8} \text{ per cent}$$

This is a grade of $4\frac{1}{2}$ in. per 100 ft. The only error in the correspondent's work is in finding the value of x from the proportion he has given, his result being twice too great.

Examination Questions Answered

Examination for Mine Examiners, Springfield, Ill., Mar. 19, 1923

(Selected Questions)

QUESTION—Two airways, one circular and the other square, each have an area of 81 sq.ft.; the length of each is 2,500 ft.; what is the difference in the rubbing surfaces of the two airways; and which will pass the greater quantity of air per minute with the same pressure?

ANSWER—The perimeter of the circular airway is

$$o = \pi d = 2\sqrt{\pi} \sqrt{a} = 2\sqrt{3.1416} \sqrt{81}$$

$$= 18\sqrt{3.1416} = 31.9 \text{ ft.}$$

The perimeter of the square airway is $4\sqrt{a} = 4\sqrt{81} = 36 \text{ ft.}$ The length of each airway being 2,500 ft. the difference in their rubbing surface is $2,500 (36 - 31.9) = 10,250 \text{ sq.ft.}$ The circular airway having the smaller perimeter and rubbing surface will pass the larger volume of air, under the same pressure. The quantities passing in the two airways will be inversely proportional to the square roots of their perimeters; or as $\sqrt{36} : \sqrt{31.9}$; or $6 : 5.6484$; or $1 : 0.9414$; or $10,000 : 9,414 \text{ cu.ft. per min.}$

QUESTION—Is the amount provided by law a sufficient circulation of air in all cases?

ANSWER—The size of the airways and passageways, in thick and thin seams, materially affects the quantity of air necessary to insure the efficient ventilation of the mine. Also, conditions in the mine relating to gas and dust, together with the depth of the workings below the surface, seriously affect the quality of the mine air. Owing to these variable conditions, the mine inspector is often authorized, by law, to require more air in circulation in a mine than what is specified in the law.

QUESTION—Which is the easier to clean out of a room, blackdamp or firedamp? Why is this?

ANSWER—If the room is driven to the rise and blackdamp is generated, there will seldom be any accumulation of this gas at the face. Owing to the fact that blackdamp is heavier than air, its tendency is to gravitate, which causes it to find its way naturally out of the room. On the other hand, firedamp, or marsh gas mixed in varying proportions with the air, being lighter than pure air, tends to rise and its removal is more difficult where the room is driven on the pitch of a seam.

Again, if a room is driven to the dip, any blackdamp generated at its face will have a strong tendency to accumulate there; and its removal, under these conditions, will be more difficult than the removal of firedamp generated in such a room. The firedamp being generally lighter than air, will tend to rise and escape from the room, making its removal comparatively easy.

In a practically level seam, the comparative ease with which blackdamp or firedamp can be removed from the face of a room will depend largely on the relative temperature of the air current circulating at the face of the room and the gas accumulated there. An air current having a lower temperature than that of the mine

will tend to travel along the floor and will then be more effective in the removal of any blackdamp accumulated there. On the other hand, if the air entering the room has a higher temperature than that of the mine its tendency is to circulate along the roof where it will be more effective in the removal of any firedamp that may be lodged there.

QUESTION—If when making an examination of a mine you found a large body of explosive gas state what precautions you would take to prevent an accident from the same?

ANSWER—No attempt must be made to remove or disturb the gas, until the men working in that section or on the return of the current and especially men working in the vicinity where the gas is found have been withdrawn. These must all be warned to extinguish their lights and withdrawn from the mine or any section where they would be in danger from the gas. When the men have been withdrawn from the mine and all entrances to the affected section and the main return airway have been safeguarded the fireboss, with a few competent men to assist him, must approach the accumulated body of gas from the intake side. If possible to do so without damage to the circulation in other parts of the mine the air current must be increased in the affected section. No open lights must be permitted in the performance of the work, which will consist in the erection of brattices to direct the air current so as to gradually sweep the gas from its lodgment, making careful tests from time to time to ascertain the progress of the work. Finally, the entire section must be thoroughly examined and reported safe, before men are again permitted to enter for work.

QUESTION—Explain the symbols CH_4 , CO_2 , SH_2 and CO , stating what are their comparative weights.

ANSWER—The symbol CH_4 indicates a molecule of methane or marsh gas, consisting of one atom of carbon combined with four atoms of hydrogen. Calling the weight of hydrogen 1, the weight of an equal volume of methane or marsh gas is 8.

The symbol CO_2 represents a molecule of carbon dioxide, consisting of one atom of carbon united to two atoms of oxygen and its relative weight or density, referred to hydrogen as unity, is 22.

The symbol SH_2 , more commonly written H_2S , represents a molecule of hydrogen sulphide, or sulphureted hydrogen, as it is sometimes called. Its relative weight is 17.

The symbol CO stands for one molecule of carbon monoxide and its relative weight is 14, referred to hydrogen as unity.

QUESTION—A current of 3,000 cu.ft. of air is at the explosive point; how much fresh air must be added to prevent a cap?

ANSWER—The detection of a cap in a safety lamp will depend largely on the observer and the kind of lamp used. If the volume of air in this case is 3,000 cu.ft. and the mixture of air and gas is at its most explosive point, containing 9.46 per cent of gas, the proportion of air in the mixture is $100 - 9.46 = 90.54 \text{ per cent.}$ The volume of the mixture is, therefore, $3,000 \div 0.9054 = 3,313 \text{ cu.ft.}$ The volume of gas in this mixture is $3,313 - 3,000 = 313 \text{ cu.ft.}$ Now, assuming that the first indication of a gas cap appears when the gas forms 2 per cent of the mixture, the volume of gas and air when the cap is first observed, is $313 \div 0.02 = 15,650 \text{ cu.ft.}$ Finally, the volume of air necessary to be added to produce this condition is $15,650 - 3,313 = 12,337 \text{ cu.ft.}$

Gandy Finds Strong Midwest Sentiment for Maintenance of National Organization

No collapse of the coal market is in prospect, in the opinion of H. L. Gandy, the executive secretary of the National Coal Association, after an extended trip through the coal-producing centers of the Middle West and the Inter-mountain section of the country. Throughout his trip he heard much talk about plans for storing coal but he saw no evidences that more than the normal amount of storage has been made. While he is not convinced that large consumers will place more coal in storage this summer than they have during other summers, he points out that any effort to that end now necessarily must be confined to the latter half of the summer.

In his conversations with operators everywhere Mr. Gandy found that there is a keen realization that a national organization must be maintained. Many operators who at this time are not affiliated with the National Coal Association are looking with approval on the work that it is doing. There is wide appreciation, Mr. Gandy says, of the work being done by the Brydon committee.

Indiana Operators to Pay State for Coal Mined Under Wabash River

Controversy over the ownership of coal under the Wabash River, which has been before the courts, ended in a sweeping victory for the State of Indiana, June 11. Representatives of coal companies, in conference with the Conservation Commission, agreed to pay the state 4½c. a ton for all coal mined before the beginning of the suit to test ownership of the fuel. For all coal mined after the filing of the suit and for all coal mined in the future, the state will receive 10c. a ton.

John W. Holtzman, a member of the Conservation Commission, who acted for the commission, said that a survey will be made by the state engineering department and representatives of the companies to determine the amount of coal which has already been mined. Payment to the state will be based on the results of this survey, Mr. Holtzman said. In the future, all coal will be mined under permits received from the conservation department and payment will be made to the state under the terms of the agreement. It is estimated that more than 9,000,000 tons of coal was involved in the controversy. Representatives of the following coal companies participated in the conference: Western Indiana Coal Co., Coal Bluff Mining Co., Lower Vein Coal Co., Grasselli Co., Miami Coal Co., Ferguson-Spears Coal Co., and Jackson Hill Coal & Coke Co.

Southwest District Operators Pessimistic In Annual Meeting at Kansas City

Pessimism, deep dyed and malignant, characterized the annual meeting of the Southwestern Interstate Coal Operators' Association in Kansas City, June 12. So gloomy, in fact, was much of the discussion of conditions of the last year that its details are being guarded as might be the darkest secrets of an abandoned past. It was to the general effect that for twelve months the Southwest had been struggling in the wilderness and deliverance from out of the hands of its enemies was not yet.

Much blame for the situation was placed at the door of labor. The general sentiment was that, with the present high wage scale, the Southwest could not produce coal at a price to compete with other fuels. "The present scale may be fair enough in thick-seam fields," W. L. A. Johnson, commissioner, said, "but in our mines of from 20-in. to 48-in. seams, it is virtually confiscatory."

During the strike last year many industries and railroads turned to oil. Many more have changed in recent months. "The fact that they would be assured of a steady supply actuated most of these buyers to install oil burners," Mr. Johnson said. "Every day present conditions continue their remedy becomes more difficult," Mr. Johnson said. "Many smaller industries are being driven out of this

district by the cost of fuel. They are being beaten by competitors in other districts who obtain their fuel more cheaply."

Anthracite Operators Submit Brief on Competition in Hard-Coal Industry

"Competition in the Anthracite Industry" is the subject of a 71-page statement submitted to the U. S. Coal Commission on June 13, 1922, by Walter Gordon Merritt, counsel for the General Policies Committee of the Anthracite Operators.

This brief sets forth "that conditions in the anthracite industry are highly competitive, and there is a notable lack of any dominating influence or power on the part of any one company or co-operating group of companies." It is pointed out that the popular impression of a combination in the anthracite industry grows out of past litigation forcing a separation of railroad and mine operations and dissolving intercorporate relations, which were held by the courts to be in restraint of trade. The impression, based on happenings in the past, has outlived the conditions to which it owed its origin, but the public is reluctant to surrender it or to give up the idea that some definite wrongdoing practiced by the operators explains the present high cost of anthracite.

The statement sets forth that there are no interlocking stock ownership or interlocking directorates and that "none of the suits or investigations involving the anthracite companies, at least in so far as they related to practices within the last twenty years, disclosed secret meetings, understandings or agreements or any so-called 'open-price plan' whereby price information was exchanged between competitors." To demonstrate how completely the company operators had discontinued the practices which, beginning in 1912, were challenged by the Supreme Court and later by the Interstate Commerce Commission, each charge is dealt with separately and each of the companies and principal anthracite railroads had included statements in regard to its business practices and history of its organization.

It is pointed out in Mr. Merritt's statement that there is no dominating interest in the industry since the largest company produces about 15 per cent of the total production. It is noted that the total output marketed by the independents has increased since 1902, that the 65 per cent contracts were discontinued in 1916. It is argued that "active competition with all of its symptoms—with its fortunate and unfortunate aspects—exists." There is no apportionment of territory, according to Mr. Merritt, in support of which is submitted a list of one thousand typical communities in the United States showing the shipments made to each and the number of Company and independent operators supplying trade in these communities. "No monopoly would tolerate such an unregulated method of distribution," says Mr. Merritt.

There is no curtailment of output except by the union and there is competition in price, it is stated. The steps taken to accomplish the segregation of railroads and coal companies is set forth fully in detail. Mr. Merritt remarks in this connection that "whether this national policy of dismemberment be wise or unwise we do not now discuss," and notes that "this requirement of segregation was a marked reversal of the established legislative policy in the past."

Referring again, in his conclusion, to the popular misapprehension regarding competitive conditions in the anthracite industry, Mr. Merritt said: "If this can be corrected and a fair understanding of the facts promoted, it will spare the industry much futile and misleading criticism and to that extent will serve to remove one of the barriers to better understanding in dealing with employees and the public."

IT IS REPORTED in Washington that the Interstate Commerce Commission has reached a decision on the assigned-car case and that its report and decision has been sent to the printer. Speculation is rife in Washington as to the direction of this decision and everyone interested in railroads and coal is awaiting release of the report, which is expected soon.

Coal Dealers, in Convention at Providence, Discuss Problems Affecting New England Trade

Disapproval of attempts by State Legislatures to set up local standards of preparation of anthracite and appealing to Congress to speedily enact a law that shall establish a standard of quality was expressed in a resolution adopted by the New England Coal Dealers' Association at its annual convention held on June 13, 14 and 15 at Providence, R. I. The association disapproved of the reported intention of the U. S. Coal Commission to include in its report a recommendation that the 2,000-lb. ton for coal be fixed. Other resolutions adopted included one for the sealing of barges, that a committee of three be appointed by the president of the association to bring about better relations between the retail dealer and wholesale distributors, and that a committee composed of three dealers from each state represented in the association be appointed to act in cases of emergency, especially relating to proposed legislation affecting coal.

It was the first time in its twenty-one years of existence that the association has held its annual meeting outside of Massachusetts. The convention was held in the State Armory, part of which was devoted to an exhibit of coal-handling machinery. W. A. Clark, of Northampton, Mass., president, presided. In his address of welcome Joseph H. Gainer, Mayor of Providence, asked that something be done so that coal consumers would be assured of a supply of coal in the summer.

T. L. Lewis, a former president of the United Mine Workers of America and now secretary of the New River Coal Operators Association, who spoke at the afternoon session of the first day of the convention, approving Mayor Gainer's suggestion for early summer buying, declared that the retail dealers occupy a position equal to that of the men who swing the pick and shovel. He said if the dealers acted as a unit no law would be passed by law-making bodies to regulate their business. He urged the dealers to induce their customers to put in at least part of their winter coal during the summer.

Mr. Lewis hoped that the U. S. Coal Commission would recommend some tangible proposition that will make strikes impossible and at the same time give a fair deal to both operators and miners.

He opposed any organization that can compel 110,000,000 persons to get down on their knees. Such an organization should be curbed, he said. Saying that soft coal is now being sold at less than cost of production, Mr. Lewis said that consumers of coal seem to the indifferent and if they do not buy at least a part of their requirements now they will pay the penalty in higher prices in the near future.

At the session on the afternoon of June 14 Dr. E. W. Parker, of the Anthracite Bureau of Information, told the dealers that ordinarily the six New England States purchase and consume something over 15 per cent of the domestic sizes of anthracite marketed in this country—that is, of the total production less shipments to Canada and small quantities exported to other countries. In the coal year 1921-22 the total domestic distribution of domestic sizes of anthracite was 38,118,952 gross tons, exclusive of shipments made by the Hudson Coal Co. Of these 38,000,000 tons the New England States took 6,429,471 tons. The allotments made to New England for the period from the time mining began, Sept. 11 to March 31, 1923, totaled 3,857,673 tons, this being on the basis of 60 per cent of the shipments made in the preceding coal year. The quantity of anthracite shipped against these allotments amounted to 4,083,066 tons, or more than 225,000 tons in excess of the allotments.

"Transportation" was the subject of an address by R. H. Newcomb, executive assistant to the president of the Boston & Maine Railroad Co. Referring to a previous statement that "fireproof" coal had been shipped into New England, he said that the Boston & Maine had purchased 400,000 tons of English coal which could have been named "fireproof" coal. He told the dealers that during the pe-

riod from September, 1922, to April 1, 1923, his road had delivered more than 40,000 cars of anthracite.

President Clark said that those dealers who had not received the questionnaire sent out by the U. S. Coal Commission were lucky. He did not know exactly what is to be done with the information obtained from them. Mr. Clark was for the twelfth time elected president of the association. Others elected were: Treasurer, G. A. Sheldon, of Massachusetts; vice-presidents, James B. Gregory, of Connecticut; J. C. Miller of Maine; G. L. Miner, Providence; H. A. Osgood, of New Hampshire; N. E. Pierce, of Vermont, and E. A. Wilson, of Massachusetts; elected to the Executive Board (to serve for three years), J. F. Higgins, Vermont, and H. L. Miller, of Worcester.

Will Continue Strike in Somerset County

At a meeting of representatives of twenty-three locals of the United Mine Workers in Somerset County held in Johnstown on June 7 it was decided to continue the strike in that field. The meeting was attended by President John Brophy, Vice-President James Marks and Secretary-Treasurer Richard Gilbert, of District No. 2, and National Board Member John Ghizzoni, of Homer City. A resolution was adopted setting forth the grievances of the strikers, expressing appreciation of the assistance accorded by the union miners and voicing unanimous decision to continue the strike for a union contract and recognition of the United Mine Workers.

"It has been carefully estimated," said J. S. Brennen, secretary of the Somerset County Coal Operators' Association, "that it has been costing District No. 2 (central Pennsylvania) between \$45,000 and \$50,000 a month to support the Somerset outlaw strike since its abandonment by the national union organization last fall.

"There are in Somerset County 13,000 non-union mine workers employed at a scale of wages higher than the union scale. There are, by actual count, on strike in Somerset County, 1,157 men.

"Brophy is skillfully spotting these 1,157 strikers all over Somerset County in small groups. Each small group, some of them not numbering more than ten or twelve, constitute, under the United Mine Workers' constitution, a local union. All of these so-called locals, engaged in an outlaw strike, are being supported by Brophy, with union money.

"In this way, by spotting, Brophy continues to increase the number of delegates among the 1,157 Somerset strikers. It follows that when these 'mushroom' delegates attend the International Convention, having been living off union money handed out to them by Brophy, they will vote on all questions as Brophy men." According to Mr. Brennen, this is a part of Brophy's campaign to succeed John L. Lewis as president of the United Mine Workers.

At the Johnstown meeting a letter was drafted and sent to Governor Pinchot asking protection for strikers against hired guards and strike breakers at the plant of the Hillman Coal & Coke Co. at Jerome.

THE IMPORTANCE OF COAL STORAGE, not only to the railroads but to consumers generally, is stressed in a letter from Secretary Hoover to J. N. Clark, president of the International Railway Fuel Association. He recommends, however, that more attention be paid to the economic side, especially costs, investment charges and the general economic value of storage, a subject on which, he says, there is insufficient data. Referring to the work of the association on fuel conservation, Mr. Hoover says that there is still a large amount of it to be done in this field along the line of greater use of the lower-grade coals. The nation, he points out, has tremendous reserves of those coals. He also stressed the importance of closer co-operation on the part of the railways generally with coal producers, individually and with their associations.

Illinois Operators Present Five Briefs On Coal Problems of That State

Five briefs dealing with problems of the coal industry in Illinois were filed with the U. S. Coal Commission on June 18 on behalf of the Illinois Coal Operators' Association, the Coal Operators' Association of the Fifth and Ninth Districts and the Central Illinois Coal Operators' Association. The briefs were presented by a committee of Illinois operators and a representative of counsel for the Bituminous Operators' Special Committee.

The most important of the briefs, entitled "Union Mine Labor in Illinois and the Determination of Wage Scales and Working Conditions," states that there has ceased to be any real collective bargaining with the miners' union in Illinois, as there is a complete monopoly of coal-mine labor, controlled by a small, centralized body of union officials which is entirely irresponsible in a legal sense. This monopolistic control has placed the coal industry in Illinois on a most unstable basis. It is further pointed out that during the last 25 years the mines of Illinois have been idle on account of strikes called by the United Mine Workers for 8 per cent of the time, and such interferences with production are becoming more and more common. A classified list of strikes and violations of contract given covers 62 pages.

Some of the causes for which strikes have been called, according to the brief, are: Attempts to weaken the authority of the management and to control the working force in violation of contract, opposition to recommendations of state mine inspectors, opposition to the introduction of labor-saving machinery, and sympathetic strikes.

Two of the briefs deal with mining-machine differential in Illinois. The differential made between machine mining and pick mining the brief states, is only 7c., as contrasted with much higher differentials in other states, the result being a great increase in mining costs, so that Illinois operators have suffered greatly in competition with operators of other states. The fourth brief points out various ways whereby increased safety and economy in mining may be effected. It is stated as desirable that specially trained men be provided to undercut the coal and to place explosives and fire charges, thus reducing the cost of producing coal and promoting the safety of the miners.

The final brief, which is a reply to the statement made some time ago to the Coal Commission by the Northwestern Dock Operators' Association, states that more economical distribution of coal to parts of the Northwest can be made by rail from the Illinois fields than by rail and water shipment via the Great Lakes route. It also points out that the only way in which coal can be stored economically is by storage at the point of consumption, and that intermediate storage, such as is involved in rail and water shipment, results in serious deterioration of the coal.

Central Pennsylvania Tells Commission How To Cure Every Ill of Coal Industry

Suggestions offered as the cure of all the ills of the coal industry were given the U. S. Coal Commission by the Central Pennsylvania Coal Producers Association in their report to the commission June 18. In 100 pages these operators of a district employing about 60,000 miners and producing between forty and sixty million tons of coal a year give the commission six cures for strikes, four causes of overdevelopment of mines that should be removed, and ask that assigned cars be abolished. They deny that the industry is as badly overmanned as is alleged. The report is signed by B. M. Clark, Harry Boulton, A. M. Liveright, Charles O'Neill and W. A. Jones.

The brief deals with a large number of subjects now under investigation by the Coal Commission. It sets forth that since April 1, 1916, two general and 664 local strikes have taken place in this district in violation of contract on the part of the United Mine Workers of America.

To eliminate these strikes in the coal industry the operators recommend:

(a) Abolition of the check-off; (b) re-establishment of real collective bargaining upon the basis of district or sectional wage agreements; (c) collective and individual legal responsibility upon the members of the United Mine Workers of America for carrying out their contracts; (d) placing wage rates in the mining industry upon a parity with other industries employing the same classes of labor; (e) the absolute right to introduce labor-saving devices and machinery without interference by the union; (f) the inclusion of arbitration clauses in all wage agreements similar to those contained in the central Pennsylvania district agreement.

Facts are set forth to prove that collective bargaining has been destroyed by the United Mine Workers through their frequent violations of agreements, and to bring about a proper re-establishment of joint relations in the mining industry the union and its members must be made legally responsible for carrying out and enforcing wage agreements.

On the matter of overdevelopment the operators disagree with the commonly accepted statement that there are 200,000 too many men in the industry. To meet the requirements of the country for coal there is not more than 8 to 11 per cent excess development, they say. Likewise there are only 50,000 to 66,000 too many men in the industry.

The operators state that this overdevelopment in the industry is due to the following causes: (1) The accessibility of coal and the small initial investment required to open a mine. (2) The development of wagon mines, especially by war-time premium prices for their coal. (3) The contest between coal-carrying railroads for the development of coal fields to insure (a) their fuel supply, and (b) secure revenues. (4) The uniform and inflexible policy of the United Mine Workers of America in maintaining a fixed wage scale in the union fields for long periods in the face of changing conditions allowing the non-union coal operators to properly meet changing conditions by adjusting wages as conditions warrant.

The operators also ask for the abolition of assigned cars as unjust, inequitable and discriminatory. They say the abolition of this form of special privilege will do more to stabilize the bituminous mining industry than any other single proposition that the commission can recommend.

The brief also deals with the history of the district, wage rates, storage of coal, housing and cost of living, open-shop mines, intermittency, absenteeism, competition, and recommends the industry be granted the right to properly disseminate information concerning prices, production, etc., so that the public may be correctly informed as to the situation at all times. The operators suggest a public hearing on labor relations, and conclude with the statement that if their recommendations are carried into effect the operation of economic law "will adjust all of the evils supposed to exist in the bituminous-coal mining industry within a reasonable time."

Capellini Leads Brennan in Election for Presidency of District 1, Is Report

Rinaldo Capellini, so-called insurgent, has defeated William Brennan, Scranton, a conservative, for the presidency of District No. 1, United Mine Workers of America, leading Brennan by some 4,500 votes it is reported.

Brennan was the John L. Lewis candidate for office and it is expected by many that this change is likely to have a strong influence in governing the demands of the mine workers when negotiations for a new agreement are made on June 26 at Scranton.

Fewer strikes and better enforcement of union laws was promised by Capellini when he was told of his victory.

A DECREE FOR THE COMPLAINANTS, the States of Pennsylvania and Ohio, against the State of West Virginia was directed by the Supreme Court, June 11, in suits instituted to restrain West Virginia from putting into effect a law compelling natural-gas companies to serve consumers within the borders of West Virginia in preference to those outside that state, in the case of gas taken from within the state. The decision was by a divided court, the majority opinion being based on the public interest.



Wholesalers in Convention Decide to Set Up System Of Arbitration to Reduce Court Difficulties

No fighting issues faced the American Wholesale Coal Association at its seventh annual convention in Cincinnati on June 12 and 13, consequently attendance was only 105 on the registry, but never more than 75 of these assembled at any one time and discussions seldom waxed warm. However, the association took an important step in deciding to inject more arbitration into the business disputes hereafter; it displayed some interest in a better credit reporting service and in the doctoring of transportation ills hanging over harassingly from the war and it elected Charles L. Dering, of Chicago, president after a small disturbance in the nominating committee. Pittsburgh had hoped to land the presidency for Jay Johns, but finally yielded. The next convention city is to be chosen during the winter.

Arbitration of disagreements between wholesaler and either producer or consumer of coal may hereafter more often settle difficulties out of court. The association expects to create an arbitration bureau of its own through which the doctrine can be preached and turned into practice. Association members are expected to see that clauses are written into all contracts committing both sides to arbitration by a man representing each party plus a third man chosen by the two. A great deal of educational work along this line is to be done beginning at once.

The 1922 offer of Colonel Sanborn, of Chicago, to turn over his credit bureau to the association was considered, E. M. Platt of Chicago spoke convincingly of the need for more careful credit work, and it was resolved by the association that the Sanborn plan be given more complete support by wholesalers. A circular explaining it will be sent to all members; they will be encouraged to report credit experience on the Sanborn forms and those who do not will be questioned by the association's executive committee.

The officers for the new year are Charles L. Dering, president; Borden Covell, of Boston, vice-president, and George H. Merryweather, of Chicago, secretary-treasurer. The executive committee is W. W. Weller, Jr., of Birmingham, Ala.; J. W. Dykstra, of Detroit; Jay W. Johns, of Pittsburgh; Jean Astel, of Cleveland; Carl A. Owen, of New York; G. W. Hill, of Cincinnati, and Harry Courtwright, of Philadelphia. The board of directors is composed

of the executive board plus C. G. McGill, of Toronto, Can.; C. L. Clark, of New Haven, Conn.; A. J. Cochran, of Indianapolis, Ind.; B. J. Read, of Baltimore, Md.; C. A. Weinhardt, of Grand Rapids, Mich.; R. H. Lee, of Kansas City, Mo.; F. S. Martin, of Omaha, Neb.; C. F. Westfall, of Omaha; Mark A. Thompson, of Syracuse, N. Y.; J. A. Collett, of Pittsburgh, Pa.; W. J. Hamilton, of Columbus, Ohio; G. H. Snowden, of Pittsburgh, Pa.; W. J. Prescott, of Memphis, Tenn.; R. R. McFall, of Morgantown, W. Va.; W. C. Maas, of Milwaukee, Wis.; Allen Parks, of Uniontown, Pa.; Andres Johnson, of Toledo, Ohio, and one more to be chosen.

In his report reviewing the year, sounding a warning against blindness to the dangers threatening the coal industry and appealing for more hearty interest in association activities retiring president Seth W. Morton, of Albany, N. Y., had this in part to say about relations between wholesaler and the commission: "The largest single question before the association today is its relations with the U. S. Coal Commission. Since the creation of that body the association has sought to be helpful in disposing of the vast task confronting the commission. I am glad to say that from the outset to this hour our relations have been most happy and cordial. The one outstanding feature of the commission is its spirit of absolute fairness and its obvious desire to arrive at the facts. We look forward with hope to the potential good that can be accomplished as a result of this investigation."

Secretary-Treasurer G. H. Merryweather reported that the membership of the association is now 420 as compared with 422 at the time of last year's convention in Detroit and that the disbursements of the association have decreased \$9,856 as compared with last year, when the commissioner-ship at Washington was combined with the traffic manager-ship.

At the opening session of the convention Tuesday, June 12, R. S. Bain, of Cleveland, speaking on the subject of better accounting, said that wholesalers lose much money every year by bad accounts, the making of unfair deductions, the unfair refusal of coal and the cancellation of orders on falling markets. He recommended the creation of bureaus of adjustment and inspection at all important coal centers,

to which shippers could report troublesome cases as soon as they arise. A bureau inspector could be put on each case.

"Send in that data," was the urgent appeal which C. A. Owen, of New York, made to the association at the opening of a sparsely attended Tuesday afternoon session. He was speaking of the information requested in the three forms for the U. S. Coal Commission. "Some day soon we are practically certain of having to appear before a congressional committee," said he. "We want to be prepared."

"The fear of God" might be a fitting title for what Franklin Bache, president of the Coronado Coal Co. and member of the Bituminous Operators' Special Committee, tried to put into the hearts of the wholesalers. He hoped to rouse his hearers to the danger that now besets not only the whole coal industry but all industry and business and to move them all to accept every opportunity to preach anti-government control.

Jay Johns, of Pittsburgh, at the Wednesday morning session declared forcefully for a discontinuance of a lot of railroad practices allowed to outlive their war-time usefulness. Permissive embargoes is the worst of them, he said. The system which allows a railroad to allot cars to a single mining company and even to a single mine for shipment of coal to some one or two coal-needy consumers during a period of embargo is wrong and is "the rawest thing yet pulled." This and the existing rules on reconsignment and diversion should be prohibited, he insisted.

Ira Cochran, commissioner and traffic man at Washington for the association, said the railroads hold that permissive embargoes are necessary even though admittedly unfair. By no other means thus far conceived is it possible to keep a distressed plant from shutting down in time of embargo. They admit the plan usually works to the advantage of only shippers who happen to "stand in" with the right railroad man. The association has asked attorneys if the practice can be stopped with injunctions, and the decision is that the remedy must be obtained through the Interstate Commerce Commission.

He said the association may soon get a hearing before the Interstate Commerce Commission on proposed changes of reconsignment and diversion rules. He told the association that the movement to get freight claims speeded up is advancing. Already the Baltimore & Ohio R.R., long considered backward—to use a term more charitable than is customary in the coal trade—is now at the forefront in the matter of auditing freight bills on coal. They all go through revision bureaus now working in such centers as Cincinnati and are audited before the coal reaches the consignee. The system catches many errors that otherwise would lead to claims rising to plague both shipper and carrier for two or three years.

Middle West Makes Progress Toward Mechanical Loaders

Further progress toward the recognition of mechanical underground loaders in the Middle West was made last week. The abortive strike at the new Orient No. 2 mine of the Chicago, Wilmington & Franklin Coal Co. was settled by the 300 strikers going back to work at the old terms, and in Indiana the union officials of District 11 agreed to meet operators in a joint conference to discuss fixing a wage scale for loader operators in that state. This movement in Indiana by no means indicates that a scale can soon be agreed upon but it is significant that the union is willing to negotiate. Both sides have chosen their representatives but no time has been set for the first meeting. It is expected before July 1.

For about eight months in Indiana loaders have been working in two mines. The difficulty of getting cars to them fast enough has been a constant problem. Other engineering difficulties have been many and many have been the schemes conceived to overcome them. Among these is a plan to load room coal at the neck of each room by spotting the loader there and dragging the coal to it by a dragline conveyor. While the loader stood in the neck, empty trips for loading could be drawn past it on the entry track. The machine could be moved from neck to neck, it is expected, thus widening its field, increasing its speed and generally

overcoming many of the difficulties of using the loader in room work. At present, operators of loaders in Indiana are paid \$12 a day.

In the Orient No. 2 mine in Illinois they had been receiving \$8.56 and struck the mine to compel scales to be installed, and the mine shifted from a day-wage development basis to a tonnage rate. This would have compelled the fixing of a loader scale. The strike was unauthorized by the district union organization and the men last week, after having had a vacation, went back to work on the old basis.

But the battle over loader pay in that state is only postponed. The Orient No. 2 mine is rapidly growing beyond the development stage and will soon require a loader scale if loaders are continued in the property, as Illinois operators hope they will be. Meantime discussion of loaders goes vigorously on among every class of mining men in the Middle West. A discussion on the last day of the Illinois Mining Institute's boat trip up the Illinois River June 7 to 9 was typical. It followed a paper by L. E. Young, president of the Union Colliery Co., on the use of a Shoveloder on rock work in the Kathleen mine, at Dowell, Ill.

A discussion followed Mr. Young's paper which made it evident that mechanical loading of coal is recognized by engineers and mining men generally as the coming thing. Mr. Garcia declared it is forcing a general revision of methods in the coal industry all the way from face to tippie and even beyond, because of the speed, economy and general desirability of loaders are compelling use of the machine by the industry and because mining practices will be made to conform to the machine instead of *vice versa*. The mechanical loader to get out the coal and the skip hoist to rush it to the surface, he said, are a pair which will not be denied entry into the coal industry.

Other men present, such as John Land, mine superintendent for the Old Ben Coal Corporation; Douglas Corner of St. Louis; Mr. Tirre, Inspector English, President Millhouse, J. Milton Duff and F. F. Jorgensen, chief engineer of the Superior Coal Co., all contributed comment and suggestion proving beyond doubt the lively interest in loaders that exists in Illinois.

It was brought out that a type of loader in Pennsylvania gets out coal at an average loading cost of \$1.40, but that in West Virginia the average in a loader mine with 6-ft. coal is only 83c. They reviewed something of the experience in Indiana, where \$12 a day is paid operators in two mines, but where obstacles of every kind are put in the way of the machines and where great difficulties are encountered in getting empty cars to the machines speedily enough.

Labor troubles stirred up by loaders was much discussed, everybody recognizing that that is a vital factor in the problem of introducing the machines. It was stated that one of the principal reasons why the loader idea is now forcing itself swiftly into the whole industry is the obstreperousness and offensive independence of union labor.

"Two men will do the work of ten," was the common statement in the labor discussion. "The union will fight hard to save the other eight their jobs."

"But the industry will benefit in more ways than one if the eight go," contributed an engineer. "For one thing the two who stay to run the machine will be higher grade men and the low-grade element in mine labor will be reduced, thus possibly putting more intelligence and less radicalism into labor relations between operators and the union."

Can Steady Coal Industry by Early Buying, Says Columbus Chamber of Commerce

"If a large majority of domestic consumers of coal could be induced to purchase their coal supply during the summer months, they would benefit as individuals by getting their coal at a cheaper price and the movement also would tend toward stabilization of the coal industry," according to a report by the Chamber of Commerce coal committee appointed to investigate the coal situation in Columbus, Ohio.

Recommendations were made that an educational campaign be started, to teach the people the value of buying their coal early and that employers be urged to assist in this campaign in such manner as deemed by them most effective and advisable.

Coal Commission's July 1 Report Holds Deep Interest In Light of Recent Supreme Court Decisions

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

A vigorous expression of views in the matter of nationalizing coal mines may be expected in the anthracite report to be made July 1 by the President's Coal Commission. Chairman Hammond, of the commission, stated last Friday that the report will contain a discussion of the whole subject of nationalization. Another pronouncement expected in the report will deal with the basis of evaluating coal properties.

The soft-coal operators, in a statement dated June 14, contend that the only equitable method of establishing valuation would be on the present market value of the properties. They deny that original cost is of value in determining present worth. To support that contention, it is pointed out that an operator who has come into the business recently would have to have his valuation established on present market price, whereas an old-established adjacent concern producing the same quality of coal under the same conditions would have his valuation based on original cost. The operators also are opposed to the Treasury method of valuation, wherein the 1913 value plus actual additions since is used.

The whole matter of valuation has been illuminated by recent decisions of the U. S. Supreme Court, to which the commission is paying the closest attention. In the opinions rendered in connection with the Southwestern Bell Telephone Co. case an analysis is made of the Supreme Court's decisions bearing on valuation. In 70 of those cases the predominant element in valuation was reproduction cost. In 118 cases the predominant element was original cost modified in various particulars. In 28 cases the chief element was book value. In 12 cases the capital represented by bonds and stock was accepted. In 102 cases a prior valuation plus the actual cost of subsequent additions was accepted.

It is quite evident that the commission cannot undertake careful evaluation of coal mines after the fashion of public-service commissions in the case of public utilities. To

undertake this would require years of time and not less than \$2,000,000 in money. It is believed, however, that the commission will have something interesting to say as to methods of evaluating which best can be applied to coal mines. Incidentally any recommendations on that subject will be of great interest to those concerned with the resources of which there is only one crop.

Unquestionably the commission is giving close attention to the Supreme Court's decision in the Kansas Industrial Court case, in which a distinction is drawn between the mining of coal and the services coming under the head of public utilities. The decision also is certain to be considered by the commission in respect to its bearing on the settlement of disputes between employer and employee. The Court's position that the fixing of wages by a tribunal with compulsory powers is a denial of freedom of contract under the Fourteenth Amendment to the Constitution is certain to have a bearing on what the Commission may say in regard to improving the present conciliation machinery in the anthracite region. Apparently the Supreme Court has shut the door to any possibility of requiring operators and miners to submit a dispute to compulsory arbitration unless the commission should take the position that the production of coal is a public-utility industry.

All of the fundamental data on which the anthracite report will be based was in hand on June 15. That it is voluminous may be judged from Mr. Hammond's statement to the effect that the documents cover 200 sq. ft. to varying depths. All of the data on which conclusions will be based are to be made public. Proper safeguards will be employed to protect legitimate business secrets. Since some arrangement and summarization will be necessary to make all of this information readily understandable, it is probable that it will be released periodically following the issuance of the report itself.

Brydon to "Knock Hell Out of Facts That Are Not Facts" in Commission Reports

"If any facts which are not facts appear in the reports of the U. S. Coal Commission, we'll knock hell out of them," declared J. C. Brydon, chairman of the Bituminous Operators' Special Committee, to the Fayette-Green Coal Producers' Association in Pennsylvania June 14. The vitriolic-tongued chairman of the special committee wasn't threatening the commission itself but only "facts that are not facts." If the threat has to be carried out, he said, the special committee will then present to the commission a statement of facts which must be found. In case of a disagreement over these between the committee and the commission, the Brydon committee will demand public hearings, and "will get them." Thus was the calm of the Fayette-Green association meeting enlivened in the Summit Hotel, six miles east of Uniontown, in the Allegheny Mountains. About 250 men were present, representing 87 per cent of the coal mined and 90 per cent of the coke produced in that part of Pennsylvania.

What Mr. Brydon had to say regarding the work of the Bituminous Operators' Special Committee was of particular interest to the operators. His talk dealt entirely with the history, policies and activities of his committee. Mr. Brydon said that the Coal Commission in a period of twelve months can only begin to arrive at an understanding of the industry. A thorough study would require as many years.

He said the vacation trip of John L. Lewis is suspected to have been a ruse to get the sympathy of English miners to support the propaganda for 100 per cent unionization in the coal industry of this country. This is Lewis' dream of

world empire, which if consummated would give him complete control of all industries. The special committee, consequently, authorized two men to go abroad to study labor conditions in Europe so that plans might be made to thwart the future steps of Mr. Lewis.

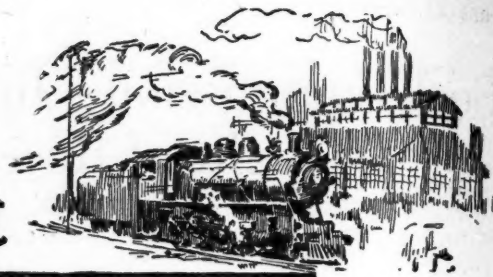
T. W. Guthrie, president of the Hillman Coal & Coke Co., spoke first, emphasizing the necessity among coal operators for co-operation, which is best realized through association. Industry is best protected by combined efforts because soundest advice does not come from an individual but rather from joint counsel. Moreover, the first line of defense in fighting the antagonistic moves of enemies of the coal industry is the local operators' association, while the last ditch is the National Coal Association.

Because a movement is on foot to bring about the nationalization of the coal industry as well as the railroad industry, the two should join forces to avert disaster which would certainly follow such a law, according to H. C. Clevenger, coal freight agent for the Pennsylvania R.R. W. G. Curren, general superintendent of transportation of the Baltimore & Ohio R.R., said that the interest of railroads in the present coal situation is secondary only to that taken by them in the problems which confront the carriers. The outcome of the present coal situation will be reflected upon the railroads in that 40 per cent of all tonnage handled by rail is coal and because the railroads now consume 28 per cent of the yearly production of coal.

Rebutting a statement made by Mr. Clevenger that present freight rates need no adjustment, J. D. Battle, traffic manager of the National Coal Association, said that coal men were vitally interested in the matter and would favor certain changes. The railroads are facing a crisis as serious as that of the coal industry, said Colonel H. C. Nutt, president of the Monongahela R.R.



Production and the Market



Weekly Review

Declining prices on soft coal have not affected demand and the production of bituminous coal continues at a level little short of 11,000,000 tons per week. That this country should have a production of 227,780,000 net tons of soft coal during the first five months of this year—exceeded only by the same period of 1918—with conditions in the market as quiet as they are is attributed to the productive capacity of the industry and evidence of its willingness to perform when it has abundant labor and even fair car supply.

A few probably appreciate that the production of anthracite at the end of May is the highest ever recorded in the corresponding period. May 31 this year the production of anthracite was 42,504,000 net tons, which is at the rate of 103,000,000 tons a year, as compared with the previous annual record of 99,000,000 tons in 1917. That there has been no need for a drive to induce householders and retail dealers to take in anthracite for the possibility of a strike on Sept. 1 is quite generally appreciated.

RAILROADS INCREASE STOCKS OF FUEL COAL

The drive behind the high rate of bituminous coal production comes from two sources: The Secretary of Commerce in Washington and the railroads. Railroads, for instance, have increased their stock of fuel coal from about six and three-quarter million tons in cars and on the ground on Jan. 1, when normally they carry large reserves, to eight and a half million tons on June 1. About a million tons of this was added in May. Working through associations and every form of organized industry the Department of Commerce has urged the storage of coal this summer.

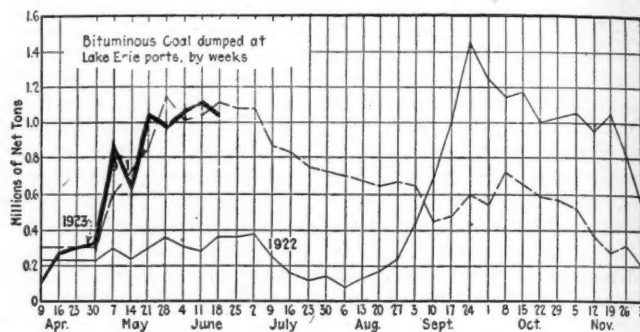
As the railroads offer better transportation service to the soft-coal mines, reports of lost time because of no market increase. *Coal Age* Index of spot prices of bituminous coal dropped 5 points last week to 210 on June 18, which corresponds to an average price of \$2.54. Slight advance in eastern Kentucky and Hock-

ing were more than offset by declines in western Kentucky, Ohio No. 8, Pittsburgh and the eastern low-volatile fields, while Western coals stood still.

The principal markets for soft coal—railroads, the coke plants, the Northwest trade—all reported gains in May over the previous month. Overseas exports are on the decline.

Demand was practically at a standstill in the Middle West, but prices held steady. Production in Illinois and in Indiana has been reduced to a point where some producers bought coal to fulfill their own contracts. In New England, buying except in small lots is almost negligible, due in part to an easing up in the cotton industry.

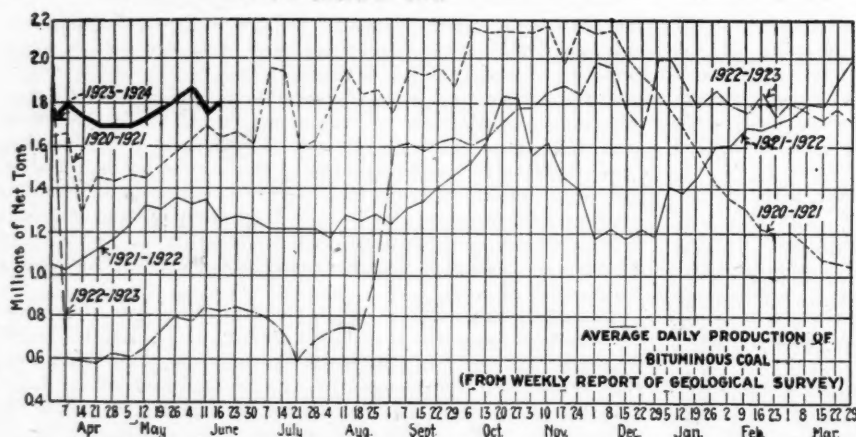
Shipments from Baltimore during the first ten days



of June amounted to 106,860 tons of cargo and bunker coal in fourteen steamers and one schooner, as compared with 107,719 tons of cargo and bunker coal in fourteen steamers during the corresponding period of May.

"Preliminary estimates of soft coal produced in the week ended June 9," says the Geological Survey, "indicate a total, including coal coked, lignite and mine fuel, of 10,708,000 net tons, an increase of 617,000 tons over the revised estimate for the week preceding.

"Early returns on car loadings during the week June



Estimates of Production

(Net Tons)

BITUMINOUS

	1922	1923
May 26	4,889,000	11,049,000
June 2 (b)	4,616,000	10,091,000
June 9 (a)	5,136,000	10,708,000
Daily average	856,000	1,785,000
Calendar year	172,248,000	241,850,000
Daily av. cal. year	1,266,000	1,778,000

ANTHRACITE

	1922	1923
May 26	10,000	1,956,000
June 2	8,000	1,606,000
June 9	13,000	2,046,000
Calendar year	21,855,000	45,192,000

COKE

	1922	1923
June 2 (b)	97,000	395,000
June 9 (a)	99,000	416,000
Calendar year	2,887,000	8,861,000

(a) Subject to revision. (b) Revised from last report

11-16 indicate a slight increase in the rate of production and a probable total output for the week of 10,800,000 tons."

Total dumpings of bituminous coal over Lake Erie piers from the opening of Lake navigation to June 10 was 6,841,488 net tons, as compared with 6,903,274 tons in the corresponding period of 1921, says the Geological Survey. Shipments of anthracite from Buffalo during the week ended June 12 was 98,400 net tons, as compared with 84,700 tons the previous week. The cumulative shipments this season to June 12, inclusive, were 715,620 tons. In the corresponding period of 1922 only 19,500 tons had been moved, but in 1921 the total to corresponding date was 1,023,000 tons. Dumping at Hampton Roads for all accounts during the week ended June 14 was 282,706 net tons, as compared with 356,349 net tons the previous week.

There is a growing demand for anthracite, especially in the larger sizes. Egg and stove continue to grow scarcer in some sections, with chestnut size becoming

stronger in demand. Buckwheat is the easiest of the steam coals.

Chicago Market at Low Ebb

Trade in all coals was at the bottom of the Chicago market during the past week. Domestic—even the best southern Illinois lump—was in no demand whatever and naturally every other Western domestic also was at a standstill. Prices were not shaken, however. Association operators stuck to \$4.35 for Franklin County prepared sizes and independents continued to get varying amounts down to \$3.25. Since there is no domestic stocking of anything but anthracite and a little coke and smokeless, about all the lump made in Illinois and Indiana went into railroad stockpiles. The only steam movement to speak of through this market was coal for immediate consumption.

The market generally is so low that shutdowns have reduced the Illinois and Indiana output to a point where several producers have been buying coal to fulfill their own contracts. Much sales activity is centered in the Northwest. The flow of Pocahontas and hard coal into the Chicago territory continues steadily with a reasonably brisk trade in the latter. As for the former, some operators were glad to see the Sandusky embargo slapped on a few days ago to restrict

Current Quotations - Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern		Market Quoted	June 19 1922	June 4 1923	June 11 1923	June 18 1923†
Smokeless lump.....	Columbus		\$3.50	\$6.25	\$6.25	\$6.00@ \$6.50
Smokeless mine run.....	Columbus		3.30	4.25	4.25	3.75@ 4.10
Smokeless screenings.....	Columbus		3.15	3.60	3.60	3.50@ 3.75
Smokeless lump.....	Chicago		3.25	6.10	6.10	6.00@ 6.25
Smokeless mine run.....	Chicago		3.10	4.10	4.10	3.75@ 4.00
Smokeless lump.....	Cincinnati		3.55	6.25	6.25	6.25@ 6.50
Smokeless mine run.....	Cincinnati		3.40	4.10	4.10	4.00@ 4.50
Smokeless screenings.....	Cincinnati		3.15	4.00	4.00	4.00@ 4.25
*Smokeless mine run.....	Boston		6.10	6.35	6.10	5.75@ 6.00
Clearfield mine run.....	Boston		3.05	2.35	2.60	2.00@ 2.75
Cambria mine run.....	Boston		3.50	3.10	3.10	2.75@ 3.25
Somerset mine run.....	Boston		3.20	2.85	2.85	2.50@ 3.00
Pool 1 (Navy Standard).....	New York		4.40	3.75	3.75	3.50@ 4.00
Pool 1 (Navy Standard).....	Philadelphia			3.75	3.70	3.35@ 4.00
Pool 1 (Navy Standard).....	Baltimore		4.00			
Pool 9 (Super. Low Vol.).....	New York		4.05	2.85	2.80	2.50@ 3.00
Pool 9 (Super. Low Vol.).....	Philadelphia		4.30	2.85	2.80	2.45@ 3.05
Pool 9 (Super. Low Vol.).....	Baltimore		3.85	2.55	2.75	2.80
Pool 10 (H.Gr. Low Vol.).....	New York		3.80	2.35	2.50	2.25@ 2.50
Pool 10 (H.Gr. Low Vol.).....	Philadelphia		4.00	2.30	2.25	2.00@ 2.40
Pool 10 (H.Gr. Low Vol.).....	Baltimore		4.00	2.15	2.25	2.45
Pool 11 (Low Vol.).....	New York		3.50	2.00	2.00	1.75@ 2.25
Pool 11 (Low Vol.).....	Philadelphia		3.75	1.95	1.90	1.70@ 2.10
Pool 11 (Low Vol.).....	Baltimore		3.50	1.95	2.00	2.25
High-Volatile, Eastern						
Pool 54-64 (Gas and St.).....	New York		3.65	1.85	1.85	1.65@ 2.00
Pool 54-64 (Gas and St.).....	Philadelphia			2.05	2.10	1.65@ 2.00
Pool 54-64 (Gas and St.).....	Baltimore		3.50	1.75	1.90	1.75
Pittsburgh sc'd gas.....	Pittsburgh			2.85	2.85	2.75@ 2.90
Pittsburgh mine run (St.).....	Pittsburgh			2.20	2.20	2.00@ 2.10
Pittsburgh slack (Gas).....	Pittsburgh			1.55	1.55	1.50
Kanawha lump.....	Columbus		3.35	2.75	2.80	2.50@ 3.10
Kanawha mine run.....	Columbus		3.25	2.05	2.05	1.90@ 2.20
Kanawha screenings.....	Columbus		3.25	1.60	1.65	1.25@ 1.65
W. Va. lump.....	Cincinnati		3.35	3.10	3.25	3.25@ 4.00
W. Va. Gas mine run.....	Cincinnati		3.35	1.70	1.80	1.25@ 2.25
W. Va. Steam mine run.....	Cincinnati		3.00	1.70	1.80	1.25@ 2.25
W. Va. screenings.....	Cincinnati		2.90	1.40	1.35	1.00@ 1.50
Hooking lump.....	Columbus		3.35	2.60	2.60	2.50@ 3.00
Hooking mine run.....	Columbus		3.10	1.85	1.85	1.75@ 2.10
Hooking screenings.....	Columbus		3.15	1.35	1.35	1.15@ 1.30
Pitta. No. 8 lump.....	Cleveland		4.00	2.85	2.80	2.25@ 3.25
Midwest						
Pitta. No. 8 mine run.....	Cleveland		\$3.70	\$2.05	\$2.05	\$1.85@ \$2.00
Pitta. No. 8 screenings.....	Cleveland		3.70	1.45	1.40	1.15@ 1.30
South and Southwest						
Franklin, Ill. lump.....	Chicago			4.05	4.05	3.75@ 4.35
Franklin, Ill. mine run.....	Chicago			3.10	3.10	3.00@ 3.25
Franklin, Ill. screenings.....	Chicago			1.80	1.80	1.75@ 1.85
Central, Ill. lump.....	Chicago			2.60	2.60	2.50@ 2.75
Central, Ill. mine run.....	Chicago			2.10	2.10	2.00@ 2.25
Central, Ill. screenings.....	Chicago			1.85	1.60	1.50@ 1.75
Ind. 4th Vein lump.....	Chicago			3.35	3.35	3.25@ 3.50
Ind. 4th Vein mine run.....	Chicago			2.60	2.60	2.50@ 2.75
Ind. 4th Vein screenings.....	Chicago			1.80	1.80	1.75@ 1.85
Ind. 5th Vein lump.....	Chicago			2.85	2.85	2.75@ 3.00
Ind. 5th Vein mine run.....	Chicago			2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings.....	Chicago			1.55	1.55	1.50@ 1.65
Standard lump.....	St. Louis			2.35	2.35	2.25@ 2.50
Standard mine run.....	St. Louis			1.80	1.80	1.75@ 1.90
Standard screenings.....	St. Louis			1.50	1.50	1.50
West Ky. lump.....	Louisville			3.85	2.30	2.30
West Ky. mine run.....	Louisville			3.80	1.80	1.75
West Ky. screenings.....	Louisville			3.80	1.35	1.35
West Ky. lump.....	Chicago			3.75	2.35	2.35
West Ky. mine run.....	Chicago			3.75	1.45	1.45
Big Seam lump.....	Birmingham			2.20	3.05	3.05
Big Seam mine run.....	Birmingham			1.85	2.05	2.05
Big Seam (washed).....	Birmingham			1.85	2.35	2.35
S. E. Ky. lump.....	Chicago			3.50	2.35	2.35
S. E. Ky. mine run.....	Chicago			3.25	2.35	2.35
S. E. Ky. lump.....	Louisville			3.75	3.50	3.50
S. E. Ky. mine run.....	Louisville			3.25	2.25	2.25
S. E. Ky. screenings.....	Louisville			3.10	1.65	1.65
S. E. Ky. lump.....	Cincinnati			3.50	3.05	3.10
S. E. Ky. mine run.....	Cincinnati			3.05	1.60	1.65
S. E. Ky. screenings.....	Cincinnati			2.85	1.55	1.50
Kansas lump.....	Kansas City			5.00	3.85	4.00
Kansas mine run.....	Kansas City			4.25	3.25	3.25
Kansas screenings.....	Kansas City			2.95	2.60	2.60

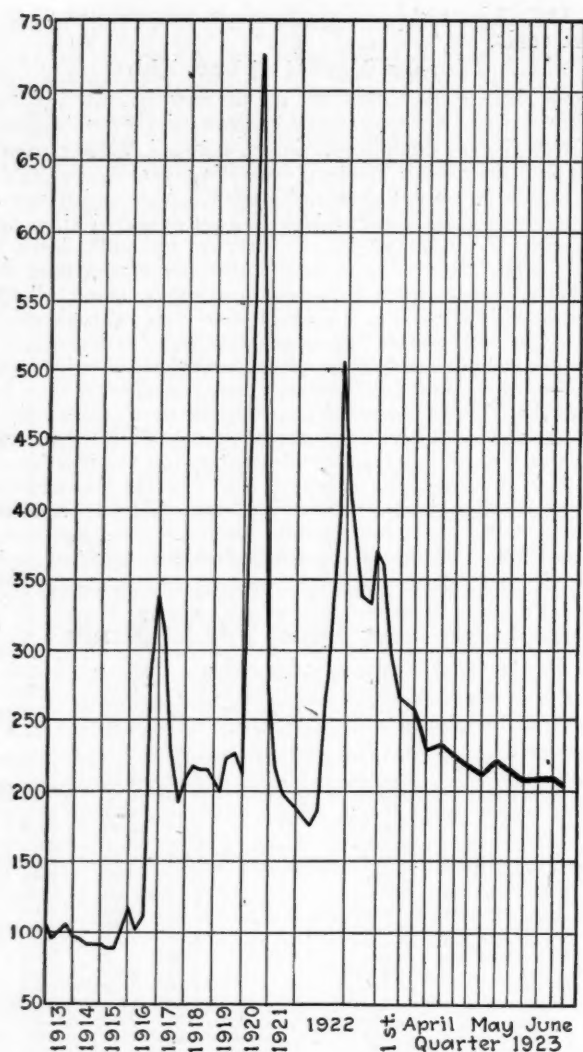
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Latest		Pre-Strike		June 11, 1923		June 18, 1923†	
			Independent		Company		Independent		Independent	
Broken.....	New York	\$2.34			\$7.60@ \$7.75		\$7.75@ \$8.35		\$7.75@ \$8.35	
Broken.....	Philadelphia	2.39			7.75@ 7.85		7.00@ 8.10		7.00@ 8.10	
Egg.....	New York	2.34			7.60@ 7.75		8.00@ 8.35		8.00@ 8.35	
Egg.....	Philadelphia	2.39			7.25@ 7.75		8.10@ 8.35		9.25@ 10.00	
Egg.....	Chicago*	5.06			7.50		8.00@ 8.50		7.60@ 10.25	
Stove.....	New York	2.34			7.90@ 8.20		8.50@ 11.50		8.50@ 11.50	
Stove.....	Philadelphia	2.39			7.85@ 8.10		9.25@ 10.00		9.25@ 10.00	
Stove.....	Chicago*	5.06			7.75		8.00@ 8.50		7.60@ 10.25	
Chestnut.....	New York	2.34			7.90@ 8.20		8.50@ 11.00		8.50@ 11.00	
Chestnut.....	Philadelphia	2.39			7.85@ 8.10		9.25@ 10.00		9.25@ 10.00	
Chestnut.....	Chicago*	5.06			7.75		8.00@ 8.50		7.60@ 10.25	
Ranges.....	New York	2.34			7.90@ 8.20		8.50@ 11.00		8.50@ 11.00	
Pea.....	New York	2.22			5.00@ 5.75		7.00@ 8.00		7.25@ 8.00	
Pea.....	Philadelphia	2.14			5.50@ 6.00		7.00@ 7.25		7.00@ 7.25	
Pea.....	Chicago*	4.79			6.00		7.00@ 8.00		6.25@ 7.25	
Buckwheat No. 1.....	New York	2.22			2.75@ 3.00		2.75@ 3.50		2.75@ 3.50	
Buckwheat No. 1.....	Philadelphia	2.14			2.75@ 3.25		2.75@ 3.50		2.75@ 3.50	
Rice.....	New York	2.22			2.00@ 2.50		1.75@ 2.50		2.00@ 2.50	
Rice.....	Philadelphia	2.14			2.00@ 2.50		1.75@ 2.50		1.75@ 2.50	
Barley.....	New York	2.22			1.50@ 1.85		1.25@ 1.50		1.25@ 1.50	
Barley.....	Philadelphia	2.14			1.50@ 1.75		1.15@ 1.50		1.15@ 1.50	
Birdseye.....	New York	2.22			2.00@ 2.50		1.60		1.60	

* Net tons, f.o.b. mines † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index 210, Week of June 18, 1923. Average spot price for same period, \$2.54. This diagram shows the relative, not the actual prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913, 1918," published by the Geological Survey and the War Industries Board.

the recent easy flow of smokeless to this territory. It was becoming difficult to maintain a price of \$4 on mine-run and \$6@6.25 on lump.

Illinois Fields Inactive

The situation in southern Illinois during the week shows a further slowing up on all sizes. The easing up on domestic sizes, however, has caused a better movement of the steam sizes that had been available, but this is nothing like what it should be under present conditions. All mines have unbilled coal on track. No 1 nut and egg seem to be the hardest to move.

A little railroad coal is moving out of the Mt. Olive district, but practically nothing in the way of steam or domestic. In the Standard district working time seems to be getting uniformly less. Railroad tonnage dropped off the past week and every mine seems to have "no bills." Some mines have not worked for five weeks and still have unbilled coal on track.

There is practically no domestic moving in St. Louis and the little that is coming in seems to be anthracite or coke, but even the coke tonnage has dropped off. Local wagon-load steam has practically stopped but a little movement of cheap coal is coming in for apartment-house storage. Local carload steam is easy, with no steam demand from the country at all. Domestic business in the country has

dropped off the same as in the city and the dealer trade generally has a pretty fair supply on hand.

Louisville Is Not Downhearted

While there is a good deal of complaint heard among Louisville coal offices over the difficulty of selling coal the general movement from the mines continues quite fair. Competition for business is very keen. Movement to the Lakes is showing a little improvement, it is said, and there is a slightly better inquiry from utilities, municipal plants, etc.

Western Kentucky mines have been having a little more distress coal on the market than usual, and this is causing complaint among some of the operators as well as jobbers, as the weak prices quoted on distress fuel makes it a hard market in which to sell coal at the mine.

Minneapolis Hard After Anthracite

The hard-coal demand at Minneapolis has been materially better this spring. Receipts at the docks have been encouraging and people appear to be remembering last year's shortage. Soft-coal buyers are more inclined to hold back. They did not have any serious experience during last winter. They propose to get lower prices and are stimulated in their efforts by the volume of demurrage stuff they have been picking up lately.

A sudden demand for screenings at Duluth has featured a market which is otherwise dead. Several industrial concerns are in the market and it looks as if large lots of screenings will move soon. One concern using more than 300,000 tons of screenings yearly has signified its intention of placing its orders for dock coal. This concern has always used Illinois coal till now. Shipments are duller than at this time last month, which is causing some anxiety among the dock men. Buyers want lower prices.

Absolute quiet prevails in the Milwaukee coal market in spite of hard work by jobbers and retailers. Nine out of ten consumers consider coal too high. Coke is in the same category and byproduct companies are finding a slow sale for their outputs. Car ferries brought 30,636 tons of anthracite, and 48,242 tons of soft coal during May. The May rail movement was confined to 50,428 tons of soft coal.

Nothing has happened in the last week to lift the gloom which settled down on the Kansas district last winter and which has been growing heavier ever since.

Utah Trade Is More Active

Utah production is now estimated to be 60 per cent of full-time capacity, a big jump in the past 10 days. Industrials such as smelters, copper companies, sugar companies and others are buying now. The contract price averages \$1.50@1.25. Railroads are not buying much. They have plenty of coal on hand. Domestic business is improving, but so far consumers have shown no disposition to rush the dealers. General Sales Manager Calvin of the United States Fuel Co. said he expected August to be the biggest month of the year because the car supply will be excellent. The beet crop will not have started to move. September, October and November, he thought, would see less activity in the coal industry.

There is a big shortage in Colorado lignite slack on account of the limited domestic business. This fuel is selling at \$1.80, an advance from \$1.25 two weeks ago. First-grade lump is \$3.50, second grade, \$2.75, mine-run, \$2.25@2.75.

Demand Quiet in Ohio Markets

Columbus, Ohio, reports no trouble from car shortage, but there is a lack of demand for coal reported from practically every section in which Ohio-mined coal sells. Domestic demand has fallen off and the steam trade is easier. Buying on the part of nearly all consumers in the Columbus territory is for immediate needs. Steam users are buying in the open market rather than entering into contracts. Demand in the Cleveland market is quiet and some mines in adjacent mining districts have closed down because of the situation. Mines in No. 8 district have been kept busy up to this time producing railroad fuel and coal for lake shipment.

There has been a return of confidence in the smokeless coal situation at Cincinnati following reports of much distress coal in the Chicago market. The market for block and 4-in. lump is listless. Standard coals held up pretty well. Quotations for West Virginia 2-in. lump at Cincinnati on June 18 were \$2.75@3 as compared with \$2.50@3 the previous week, and for southeastern Kentucky 2-in. lump \$2.50@3 as compared with \$2.50@2.75.

With ample car and labor supplies, production of coal in the Pittsburgh district moved up so easily and smoothly that the increase in demand is not fully realized.

Buying Negligible in New England

Cotton manufacturers in New England to a considerable number have curtailed production from a third to a half and there are enough other industries so nearly in the same position that except for scattering small lots buying is almost negligible. Reduced prices on the Southern coal have removed the inducement for buying high grades all-rail from central Pennsylvania in a widening area.

Sales of Pocahontas and New River are very light. Operators have been obliged to slow down production to avoid carrying large tonnages on cars at the piers, and prices have shown a further decline as compared with a week ago. No. 1 Navy standard coal sold down to \$5.75 per gross ton, f.o.b. vessel, with shippers of No. 2 coals and the high volatiles actively soliciting offers. At Boston for inland delivery also the price level has dropped and where a month ago quotations were firmer at \$8.25 per gross ton on cars they have now receded to \$7.50 and less.

All-rail prices remain practically unchanged. The hardening tendency noticed a few weeks ago, especially on the choice coals, is now eliminated, and the agencies that did not then improve the opportunity to tie up business are beginning to feel the effects of the dull market. No. 1 coals have sold down to \$3.25 and \$3 per ton at the mines, and new consignments are not readily obtained.

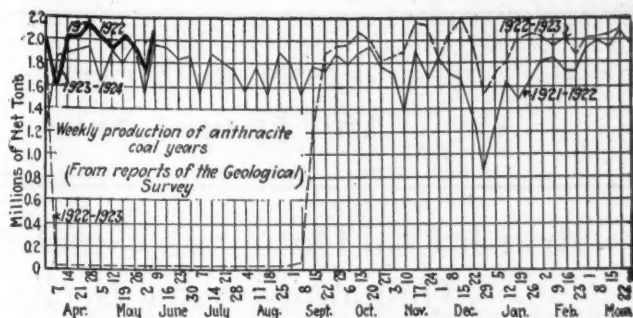
Spotty Tendency in New York Market

The New York market is spotty, sales depending principally on the prices quoted and the buyer's needs. Some shippers believe the bottom in prices has been reached but they do not look for any substantial increase in either prices or demand until the latter part of August or early in September. In the meantime the situation may be affected by the anthracite wage negotiations.

Consumers in the Philadelphia market appear to be taking slightly more interest in the situation and it is believed that some quiet contracting has been going on, principally on the initiative of the consumer.

Inquiries for commercial coal in the Birmingham (Ala.) market is practically at a standstill. Inquiries, which are few, are for small tonnages. The feature of last week's market was the closing of contracts for supplying the Southern Railway system for the next twelve months, 1,250,000 tons being involved, which is about the same as was required last year.

Of the sixty-two cargoes of coal arriving at Duluth last week, five of them were anthracite. It is reported that twenty-five more, of which four are anthracite, are on their way. It was estimated that on June 1 stocks on the docks amounted to 1,750,000 tons of bituminous coal and 150,000 tons of anthracite. Since May 3, when the first cargo arrived, 122 cargoes have arrived at Milwaukee, twenty-



seven carrying 216,119 tons of anthracite and ninety-five carrying 780,889 tons of soft coal. Dumpings at Lake ports during the week ended June 18 were 1,020,176 net tons of cargo coal and 54,667 net tons of fuel coal, making dumpings for the season 7,391,956 tons of cargo coal and 342,765 tons of fuel coal.

Domestic Users Watch Anthracite Situation

Consumers of the domestic sizes of anthracite are closely watching the situation in the coal fields. They are becoming more insistent concerning deliveries and some are already putting substitutes, principally coke, into their bins. In the New York market there has been a slightly increased demand for broken coal to take the place of either egg or stove, both of which are short. Chestnut coal is stronger. The upper region steam coals are in better demand than those from the Southern fields.

Stove coal is short in the Philadelphia market and some retail dealers have advanced their prices for this size in an effort to relieve the situation. Retail dealers are urging shippers for more coal. Slow shipments to Baltimore make it difficult for retail dealers there to fill orders.

"During the week ended June 9 the rate of production of anthracite recovered from the holiday slump," says the Geological Survey. "The total output is estimated at 2,046,000 net tons, including mine fuel, local sales, and product of washeries and dredges."

How the Coal Fields Are Working

Percentages of full-time operation of bituminous coal mines, by fields, as reported by the U. S. Geological Survey in Table V of the Weekly Report.

	Jan. 1 to Apr. 1, 1922 Inclusive	Sept. 5 to Dec. 30, 1922 Inclusive	Jan. 1 to June 2, 1923 Inclusive	Week Ended June 2, 1923
U. S. Total.....	55.7	36.3	39.7	77.9
Somerset County.....	74.9	51.3	57.9	69.2
Panhandle, W. Va.....	51.3	57.3	57.9	69.2
Westmoreland.....	58.8	65.8	58.6	67.1
Virginia.....	59.9	55.7	57.9	64.4
Harlan.....	54.8	22.1	21.7	27.5
Hazard.....	58.4	16.4	26.9	43.6
Pocahontas.....	60.0	36.6	35.4	45.7
Tug River.....	63.7	28.8	38.3	49.4
Logan.....	61.1	26.2	32.4	41.3
Cumberland-Piedmont...	50.6	31.7	50.9	73.6
Winding Gulf.....	64.3	30.4	36.8	42.9
Kenova-Thacker.....	54.3	42.4	37.8	(a)
N. E. Kentucky.....	47.7	28.4	30.5	36.5
New River.....	37.9	31.6	37.2	43.2
Oklahoma.....	59.6	59.1	44.2	44.9
Iowa.....	78.4	75.9	70.2	58.8
Ohio, Eastern.....	46.6	40.8	41.0	78.3
Missouri.....	66.8	76.3	69.5	66.1
Illinois.....	54.5	49.9	42.7	37.0
Kansas.....	54.9	55.9	47.3	68.7
Indiana.....	53.8	37.7	46.9	47.2
Pittsburgh†.....	39.8	41.2	41.5	63.8
Central Pennsylvania....	50.2	53.4	50.9	69.2
Fairmont.....	44.0	35.5	44.4	69.4
Western Kentucky.....	37.7	32.4	31.8	27.5
Pittsburgh*.....	31.9	56.1	65.7	88.4
Kanawha.....	13.0	15.6	24.7	28.8
Ohio, Southern.....	24.3	38.1	30.7	31.9

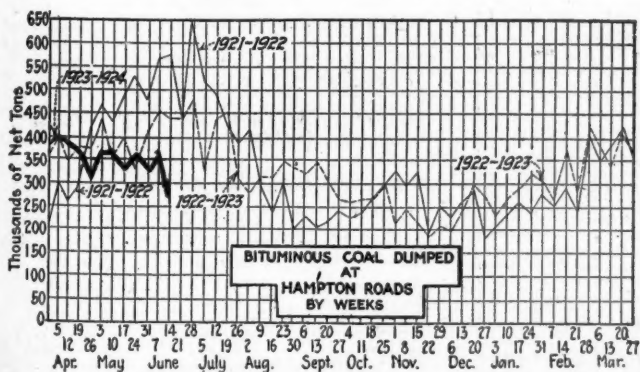
* Rail and river mines combined.

† Rail mines.

(a) No report.

Car Loadings, Surpluses and Shortages

	Cars Loaded		Surplus Cars		Car Shortage	
	All Cars	Coal Cars	All Cars	Coal Cars		
Week ended June 2, 1923.....	932,041	171,248				
Previous week.....	1,014,029	192,092				
Same week in 1922.....	739,559	86,289				
June 7, 1923.....			284,189	180,831		
Same date in 1922.....			32,443	3,953	16,277	11,392
May 31, 1923.....						



Foreign Market And Export News

British Coal Output Rebounds Sharply; Quotations Show Decline

Output of coal in Great Britain's mines during the week ended June 2 totaled 5,721,000 tons, says a cable to *Coal Age*, an increase of 1,990,000 tons over the production of the previous week. Prices continue on the downward grade, with demand for immediate shipments easier.

Buyers in the Welsh markets are holding off in the hope of lower prices, but, owing to heavy orders waiting fulfillment the strength of the market is well sustained. The decline in output over the holidays is reflected in a scarcity of superior grade coals for prompt shipment.

Beyond this month the outlook is less satisfactory, and middlemen holding contracts made when prices were very much lower are inclined to undersell the mines.

The market in the north of England is quieter and also somewhat weaker. The German demand is not so insistent, and labor troubles have obstructed dealings with Belgium, Holland and Denmark. The result is an accumulation of coal-laden steamers and an interruption of the steady flow of business. France is buying very cautiously. The mines are sold heavily over this month.

French Coal Situation

Coal supplies in Paris are somewhat depleted because of the strike of Belgian railway employees, but with the men back at work it is expected there will be no further trouble. However, some additional trouble is expected in the Sarre coal fields where the mine officials have put forward the following "revendications": Increase of wages, speedier promotion, extension of annual leave, and constitution of a committee to represent the officials' interests with the management.

Coke is being received by the Société des Cokes de Hauts-Fourneaux from the Ruhr at a daily average of about 5,000 tons. American coke continues to arrive, but it is very different from the coke usually used in French blast furnaces. Because of this French metallurgical concerns are making

special investigations as to the best means of utilizing it. Some concerns are using it to the extent of 40 per cent as a component part of special coke mixtures, while others use about 15 per cent of it in their furnaces.

Production of French collieries during March and April, in metric tons, follows:

COAL			
March.....	3,012,116	April.....	2,999,617
COKE			
March.....	149,285	April.....	156,035
BRIQUETS			
March.....	262,316	April.....	214,342

One reason given for heavier production of coal and briquets in March is that there were 27 working days in that month as compared with 24 in April.

Dullness Affects Hampton Roads Market

Business slackened at Hampton Roads last week with the customary summer dullness settling over the market. Embargoes on coal to the Great Lakes slowed up coastwise shipments, while all branches of the trade were light.

Decline in prices continued, and buyers were not eager to come into the market under the circumstances. Few contracts were being made, and shippers reported inquiries very rare.

Domestic dealers, in some instances, were making contracts on the most favorable basis in the last twelve months. Export business held fairly firm, but no new contracts in this trade were evident.

German Coal Prices Advance

An increase of 53 per cent was made in the price of coal throughout Germany to take effect June 1, according to an announcement made at Berlin. The advance was made in consequence of the further depreciation of the mark and an increase in wages granted the miners. The increase will make Ruhr coal cost 221,000 marks a ton, as compared with about 437,000 marks a ton for English coal delivered at Hamburg.

Export Clearances, Week Ended June 16, 1923

FROM BALTIMORE		Net Tons
For Belgium:		
Du SS. Amersfoort		11,212
For Brazil:		
Nor. SS. Bjornstjerne Bjornson		7,458
For France:		
Belg. SS. Carlier		11,733
Jap. SS. Biyo Maru		7,483
Fr. SS. Vendorne		6,615
Ital. SS. Persco		8,071
For Germany:		
Br. SS. Glentworth		9,250
For Italy:		
Nor. SS. Atlantis		8,175
For Porto Rico:		
Am. SS. Major Wheeler		503
For Spain:		
Span. SS. Astoi Mendi		7,783
For Sweden:		
Swed. SS. Orangesberg		7,019
For West Indies:		
Am. Schr. Purnell T. White		1,046

FROM HAMPTON ROADS

For Brazil:		
Swed. SS. Atland, for Rio de Janeiro		6,321
For Canada:		
Nor. SS. Almora, for St. Thomas		3,463
For Chile:		
Nor. SS. Vendeggen, for Valparaiso		2,014
For Cuba:		
Nor. SS. Ravnanger, for Havana		5,127
Br. SS. Macabi, for Banas		4,022
For Italy:		
Ital. SS. Nicolo II, for Porto Ferrajo		6,745
For Porto Rico:		
Amer. SS. Mariana, for San Juan		3,994
For West Indies:		
Br. SS. Matura, for Port au Spain		2,331

United States April Coal and Coke Imports

(In Gross Tons)		1922	1923
Anthracite		1,391	14,516
Bituminous (free		68,695	67,006
dutiable			92,247
Imported from:			
United Kingdom		16,095	62,783
Canada		43,597	92,247
Japan		100	13
Australia		8,146	4,210
Other countries		757	
Coke		432	5,439

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.		June 7	June 14
Cars on hand		980	998
Tons on hand		59,228	60,102
Tons dumped for week		111,884	88,685
Tonnage waiting		10,400	5,300
Virginian Ry. piers, Sewalls Pt.:			
Cars on hand		1,578	1,764
Tons on hand		92,080	100,020
Tons dumped for week		134,235	95,698
Tonnage waiting		20,221	14,888
C. & O. piers, Newport News:			
Cars on hand		1,034	1,357
Tons on hand		57,920	71,935
Tons dumped for week		72,050	68,033
Tonnage waiting		2,550	12,880

Pier and Bunker Prices, Gross Tons

PIERS			
	June 9		June 16
Pool 9, New York.....	\$5.65@	\$6.00	\$5.50@ \$6.00
Pool 10, New York.....	4.95@	5.50	4.75@ 5.00
Pool 11, New York.....	4.00@	4.75	4.00@ 4.75
Pool 9, Philadelphia.....	5.50@	5.90	5.45@ 5.85
Pool 10, Philadelphia.....	4.60@	5.30	4.45@ 5.25
Pool 11, Philadelphia.....	3.80@	4.45	3.75@ 4.40
Pool 1, Hamp. Roads.....	6.35@	6.50	6.75
Pools 5-6-7, Hamp. Rds.	4.85		4.85
Pool 2, Hamp. Roads.....	6.10		5.65

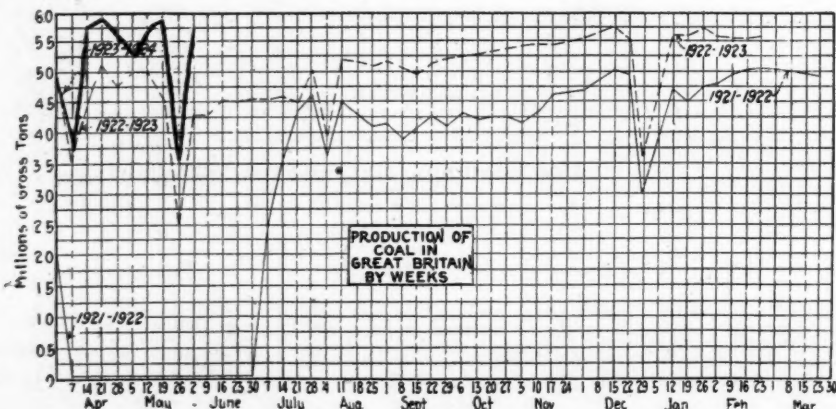
BUNKERS

Pool 9, New York	5.95@ 6.30	5.80@ 6.30
Pool 10, New York	5.25@ 5.80	5.05@ 5.30
Pool 11, New York	4.30@ 5.05	4.30@ 5.05
Pool 9, Philadelphia	5.90@ 6.10	5.85@ 6.05
Pool 10, Philadelphia	4.90@ 5.60	4.85@ 5.55
Pool 11, Philadelphia	4.05@ 4.75	4.00@ 4.75
Pool 1, Hamp. Roads	6.35@ 6.50	5.85
Pool 2, Hamp. Roads	6.10	5.65

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to Coal Age		June 9	June 16†
Admiralty, large	40s. @ 41s. 6d.		32s. 6d.
Steam smalls	31s. 6d.		26s. 3d.
Newcastle:			
Best steams	27s. 6d. @ 28s. 6d.		27s. @ 28s.
Best gas	32s. 6d.		30s. @ 32s. 6d.
Best bunkers	30s. @ 32s.		30s. @ 32s.

† Advances over previous week shown in heavy type, declines in italics.



News Items From Field and Trade

ALABAMA

Announcement is made that the Pratt Fuel Co. has purchased the properties of the Dora Fuel Co. and Kershaw Mining Co., at Dora, Walker County. Frank Marquis, president of the Dora Fuel Co. and John Stone, of the Kershaw Mining Co., will be officials of the consolidated companies, of which Waler Moore will be president.

COLORADO

Work on the Moffatt tunnel in Colorado is to be started within a month. The ruling of the U. S. Supreme Court during the past week that the Colorado law is constitutional providing for the construction of the Moffatt tunnel, clears the way, the tunnel commission has announced. In Moffatt and Routt counties, it is estimated by state engineers, there are 79,349 acres of coal lands which have an estimated future production of coal from workable beds of 2,014,740,253 tons. In addition, there are 99,488 acres in the two counties which should, at the lowest estimate, yield 99,488,000 tons. The project also will open up valuable oil and oil shale lands. Friends of the tunnel project assert that it means to Denver and Colorado what the immense harbors at San Francisco and New York city mean to those cities. Opponents declare the others are too optimistic, that the coal market will not absorb the Routt County output and that the southern Colorado coal fields will suffer keenly.

ILLINOIS

Thirty thousand dollars of the Herrin defence fund has been returned to the donors. Originally \$60,000 was collected from business men of Illinois through the State Chamber of Commerce to support the prosecution of the case by the state Attorney General's office after it became known that state funds were insufficient.

Bids for furnishing and delivering bituminous coal to Illinois charitable, penal and reformatory institutions and the state normal schools have been requested by the State Department of Public Works, Division of Purchases and Supplies, for the period from July 1, 1923, up to and including June 30, 1924. Bids will be received up to 10 P. M., June 25.

Two hundred miners or more are expected to compete in the state mine rescue contest to be held at Collinsville, June 23. Medals will be given all contestants and loving cups will be presented to the winning teams. Over thirty teams have already been entered in the event and three or more winning teams will be sent to the international first-aid contest at Salt Lake City.

Tests are being made and plans formed for the opening of a new mine between St. Johns and Du Quoin in the future. In all probability the mine will be a stripping operation. Work is being carried on by men connected in a way with the Majestic Coal & Coke Co., of Du Quoin, and it is thought that that company is back of the present plans, although no official announcement has been given by that company.

The Reynolds Coal & Fuel Mining Co., Loami, has been incorporated with a capital of \$14,000, to mine and deal in coal; incorporators, C. M. Reynolds, L. D. Reynolds, John R. Reynolds; correspondent, Ed. D. Henry, 508 Myers Building, Springfield.

M. M. Leighton has been appointed chief of the Illinois Geological Survey at Urbana, succeeding F. W. DeWolfe, who resigned last spring. During the interim Harold E. Culver was acting chief.

The Dering Coal Co. is building the two-and-a-half-mile railroad now being constructed from a Dering mine near Eldorado to a connection with the Big Four near Wasson. It was erroneously reported that the Illinois Central R.R. was building it. Illinois Central engineers laid it out but the line belongs to the Dering company. It is not yet determined whether the short road will be operated by the Big Four or by the Dering company.

A new coal mine with anticipated production of 300 tons will be opened on the To-

ledo, Peoria & Western R.R. west of Civer, a village near Canton. The firm of McGlaughlin Bros. has leased about 400 acres of coal lands. They have been engaged for fifteen years in the coal business in Canton.

A bill for accounting, for receivership and for an injunction has been filed in the St. Clair County Circuit Court by Elmer H. Michael H., and Robert C. Wright, of Belleville, Ill., against the Red River Coal Co., J. A. Knebel and A. W. Sieglaff. The corporation was formed in 1922, the capital stock being \$150,000, of which \$100,000 was common and \$50,000 preferred. Elmer H. Wright, J. A. Knebel and A. W. Sieglaff were named directors.

No. 2 mine at Du Quoin, formerly operated by the Old Abe Mining Co., of that city, and the output of which was sold through the Kanawha Fuel Co., Milwaukee, has been taken over by J. M. Mitchell, coal operator of Royalton. The new owner of the shaft has sent an engineer to the mine and a force of men have been put to work cleaning up ready for operation. This mine was closed down over a year ago, and while much of the machinery and equipment was left in the plant, quite an amount of new installation will be made.

INDIANA

The Bloomington Block Coal Co., Bloomington, has been chartered with a capital of \$20,000; directors, John S. Risher, Helen T. Risher and Ina R. Irvine.

A cave-in of the seventh southwest entry of Francisco No. 1 mine, involving an area of about 200 sq.ft. underground, caused the sinking of earth under the main line tracks of the Southern Ry. near Princeton, Ind., recently. The sunken area at the surface was 100 ft. square. No further spread of the cave is expected.

The Board of Trustees of Indiana University, at Bloomington, Ind., is receiving bids for the installation of coal- and ash-handling equipment to be used in connection with the new power house there. The board also is seeking bids on a large traveling crane. Bids will close June 22. Charles R. Ammerman, 520 Occidental building, Indianapolis, is the engineer in charge of the work.

IOWA

The Northwestern Coal Co., of Albia, has five prospect drills at work in the Coal Glen neighborhood near Columbia. This is the second visit of the drillers to that locality. They drilled each 40-acre tract upon which they had prospect rights. The present intention is thoroughly to prospect every ten-acre tract.

KANSAS

The Capital Coal & Mining Co., of Topeka, with an authorized capitalization of \$200,000, has been incorporated by the following, all of Topeka: O. M. Lyons, F. L. Loveless, Fred D. Coffman, Florence G. Coffman and John E. Barrett. Mr. Barrett is Governor Davis' choice for state oil inspector and now has a suit pending in the State Supreme Court to try to oust Hugh Duff, Republican, appointed to the position by Governor Allen.

KENTUCKY

The Kentucky Block Coal Co., of Lexington, is reported to have purchased hard wood timber lands near Whitesburg.

The St. Mihiel Coal Co., McCreary, has increased its capital stock from \$25,000 to \$40,000.

Numerous improvements are being made by the Chesapeake & Ohio Ry. in the Big Sandy District of Kentucky. When such improvements to trackage and yard increases are completed it will be possible for the road to handle approximately 1,200 cars per day instead of about 300 per day, as under present facilities.

LOUISIANA

The District Engineer, 140 Decatur St., New Orleans, will soon let contract for 5,000 tons bituminous coal for shipment to Natchez, Miss., and 1,500 tons for shipment to New Orleans, for flood control works.

NEW YORK

Burns Brothers stockholders at their annual meeting June 14 in Jersey City voted in favor of the recapitalization plan submitted by a special committee of directors. The plan as approved calls for the retirement of both issues of preferred stock, the conversion of the Class A common stock into preferred stock of the recapitalized company and conversion of the Class B stock into common stock of the recapitalized company. One share of common stock of the new company will be given with each share of Class A common, also the right to subscribe to one additional share. The right to subscribe to one additional share of common stock also will be given to present Class B common stockholders.

For probably the first time the Board of Purchase of the City of New York received proposals on June 12 for furnishing and delivering to various points in the five Boroughs 29,121 tons of briquets as a substitute for egg, stove and chestnut coals "in so far as the department's requirements permit." The specifications provide that the briquets shall show on analysis maximum moisture 3 per cent as delivered; maximum ash, 16.5 per cent dry coal; minimum B.t.u., 12,400; maximum volatile combustible matter, 9 per cent. The proposals called for 245,076 net tons of anthracite; 73,621 tons bituminous run of mine coal; 65,800 tons mixed coal; and 103 tons George's Creek. Deliveries are to be for the period July 1, 1923, to March 31, 1924. Bids for furnishing and delivering 12,165 tons of briquets in Manhattan ranged from \$11.03 to \$13.20 per ton; for 9,239 tons in Brooklyn, and 2,682 tons in Queens, \$11.03 to \$11.95; for 4,266 tons in the Bronx, \$11.03 to \$11.65 and for 779 tons in Richmond, \$11.12 to \$13.03. Bids received for furnishing and delivering domestic sizes of anthracite in the various boroughs ranged as follows: Manhattan—Egg, stove and chestnut, \$13.75 to \$16, pea coal \$9.94 to \$12. Brooklyn—Egg, \$13.61 to \$15.50, stove and chestnut sizes \$13.50 to \$15.50 and pea, \$9.94 to \$10.38. Queens—Egg, stove and chestnut, \$14.55 to \$15.50. The Bronx—Egg, stove and chestnut sizes, \$14.50 to \$16. Other bids received for Manhattan deliveries included the following: 9,000 tons mixed coal, 75 per cent; No. 3 buckwheat and 25 per cent soft coal, \$5.34 to \$5.79; 6,280 tons No. 2 buckwheat, \$5.69 to \$6.03, and 2,056 tons soft coal, run of mine, \$6.64 to \$8.28.

For Brooklyn deliveries the proposals received included the following: 7,400 tons No. 1 buckwheat, \$5.19 to \$6.07; and 14,600 tons mixed coal (12,950 tons No. 2 buckwheat and 3,650 tons soft coal), \$5.60 to \$6.39. For furnishing and delivering 12,065 tons No. 1 buckwheat in Queens borough the bids ranged from \$5.51 to \$7.42. For furnishing 9,225 tons of run of mine to boats of the various city departments the bids ranged from \$6.96 to \$7.20.

Proposals calling for barge deliveries to various points included the following: 113,520 tons No. 1 buckwheat, \$5.08 to \$6.41; 8,000 tons No. 2 buckwheat, \$4.78 to \$5.79; 40,000 tons No. 3 buckwheat, \$3.60 to \$4.29; 32,066 tons run of mine, \$5.44 to \$6.48; 19,200 tons mixed (6,900 tons soft coal, 4,200 tons No. 3 buckwheat and 8,100 tons No. 2 buckwheat) \$4.71 to \$6.03; 400 tons egg coal, \$11.42 to \$13.75; 748 tons stove coal, \$15, and 350 tons coke, \$10.59 to \$13.20.

For furnishing and delivering to various institutions in Orange County New York, to watersheds the following bids were among those received: stove and chestnut coal, \$13.50 to \$16; No. 3 buckwheat, \$3.60 to \$3.62; and run of mine, \$5.61 to \$5.78. Bids received for furnishing in car load deliveries 8,550 tons soft coal, run of mine, for Brooklyn watersheds outside the city limits on Long Island ranged from \$5.76 to \$6.60, and for furnishing and delivering in carload lots to the Ridgewood Brooklyn pumping station, 15,650 tons soft coal, run of mine, \$5.65 to \$6.33.

OHIO

The following coal companies were incorporated in this state recently: The Long Hill Coal Co., Nelsonville; capital, \$25,000; L. J. Eberle, R. S. Oxley, A. H. Schory, O. P. Amann and M. E. Voll. The Zanesville Coal Co., Zanesville; capital, \$200,000; S.

H. Carrick, C. W. Howell, E. F. O'Neal, C. L. Truesdell and H. C. Pugh. **The Terminal Fuel Co.**, Cleveland; capital, \$25,000; Arthur B. Ragon, L. A. Ragon, C. E. Cline, Fay S. Zimmerman and H. L. Smith. **The Blue Flame Coal Co.**, New Lexington; \$25,000; Sheldon Kinsel, R. W. Murray, Raymond Diller, T. M. Potter and Thomas Ward.

The Ernst Coal Co. and the **Sandford Coal Co.** have merged, with offices at 1201 Public Square, Marion; capital, \$1,500,000; incorporators, H. J. Meehan, John C. Cosgrove, R. B. Mitchell.

The Kensington Coal Co., Youngstown, has increased its capital from \$40,000 to \$75,000, and the **Battle Axe Coal Co.**, Massillon, from \$10,000 to \$100,000.

The U. S. Court of Appeals at Cincinnati denied the petition of **Sherman Everett**, trading as the **Western Coal Co.**, for a rehearing of the case in which the **Emmons Coal Mining Co.** of Philadelphia and **Charleston, W. Va.**, obtained a verdict for about \$16,000 because of the violation of a contract for the delivery of coal some three or four years ago.

OKLAHOMA

Local Union No. 719, United Mine Workers, at Henryetta, has filed suit in the Superior Court of Logan County seeking receivership for the **Monarch Coal Co.**, which has been operating mines at Kuss. Plaintiffs allege in their petition that the defendant company is in debt to various coal miners, members of the local, in sums ranging from \$10 to \$80, such indebtedness aggregating a total of \$470, and ask that a receiver be appointed to conduct the affairs of the company until these claims are paid.

The Mammoth Vein Colliery Co. has been incorporated in Muskogee, with a capital of \$10,000, by T. H. Niles, Muskogee, and J. G. Puterbaugh and E. P. Joyner, of McAlester.

PENNSYLVANIA

Net income of the Pennsylvania Coal & Coke Corporation for the first four months of 1923 totaled \$469,612, before federal tax deductions, which was equal to \$2.71 a share on 172,606 shares of \$50 par. This is equivalent to slightly more than 16 per cent income annually.

Mrs. Charles F. Huber, wife of the president and general manager of the **Lehigh & Wilkes-Barre Coal Co.**, and her chauffeur, **Oliver Gibbons**, were so badly burned by an explosion of gasoline at her home in Wilkes-Barre, June 12, that both died a few hours later. She was prominent socially and a leader in civic affairs.

The House Mines and Mining Committee at Harrisburg took favorable action June 6 on the **Clarke Senate bill** exempting mine inspectors from furnishing surety bonds and permitting the chief of the Bureau of Mines to designate the number of days the members of the miners' inspectors examining boards shall be paid for their services.

After passing the Senate by a vote of 35 to 11, the **Joyce Compensation Bill**, which provides increases in workmen's compensation rates from \$12 to \$15 per week, was defeated in the House by 94 to 85. It required 105 votes to send it to the Governor. An effort may be made to get the House to reconsider its action.

Three mine workers were burned June 13 in an explosion of gas in the Henry Colliery of the Lehigh Valley Coal Co. at Plains. The explosion occurred shortly before noon in the Red Ash vein. It knocked over some timber and ventilation equipment but no other damage was caused to the mine property.

Mine Inspector W. T. Williams at Scranton says that over 100 mine workers in the territory between Peckville and Avoca have qualified for the positions of foreman and assistant foreman. The examination was held in the Board of Trade building May 1. The names of those who passed have been forwarded to Harrisburg for approval of Joseph J. Walsh, chief of the mine bureau. It was one of the largest single classes to qualify since the certificate law was enacted.

Mining operations were resumed June 12 in No. 28 slope of the **Dorrance colliery**, where a fire raged for two weeks. John M. Humphrey, president of the **Lehigh & Wilkes-Barre**, announced that all trace of fire had disappeared. He said reopening of the slope would give employment to approximately 100 men. Mr. Humphrey also said that a fire which started from an explosion June 11, resulting in burns to two men, was extinguished within a short time. When the flames were first discovered

thousands of feet of hose were immediately rushed into the mine.

The House at Harrisburg on Monday evening, June 11, passed finally the **Davis-Fowler mine-cave bills**, which provide that 12½ per cent of the anthracite tax collected by the state be returned to the anthracite counties. One-half of this sum is to go to the Anthracite Mine-Cave Fund for protection against mine caves and the other half to the Anthracite Municipalities Fund for municipal improvements. Each of the bills creates one of the commissions. Representative Fowler explained the bills and there was no debate. Governor Pinchot has gone on record as saying that unless the Legislature provided other revenues the state could not afford to divide the anthracite tax among the counties. Both Senate and House having passed the bills, the question of their signature is now up to him.

To compel the employment of a man for eight hours to do half an hour's work, employees at **New Castle colliery of the Reppier Coal Co.**, Minersville, are on strike and the colliery is idle. Men working in the separator at the colliery demanded that the company employ a man for a full day to oil the machinery. The oiling requires fifteen minutes of a man's time twice a day and had been done by one of the regular employees. This man objected to doing two jobs and the matter was taken up with the mine grievance committee, which agreed that the demand of the separator men was absurd. The matter apparently was settled, but the employees, after working ten minutes, decided to strike until the company complied with their demand.

Shipments of anthracite during the month of May, 1923, as reported to the Anthracite Bureau of Information, Philadelphia, amounted to 6,564,285 gross tons, as compared with 6,173,774 gross tons during the preceding month of April, an increase of 390,511 tons, or 6.3 per cent. Comparing the shipments of May this year with the same month in 1921, an increase of 770,390 tons is recorded, or 13.3 per cent. The shipment of prepared sizes last month established a record for May, and was only approached during the month of May in the years 1917 and 1918, when the maximum production was reached. Shipments by originating carriers were as follows:

	May 1923	April 1923
Phila. & Reading.....	1,152,026	1,170,925
Lehigh Valley	1,150,037	1,088,783
Central R.R. of N. J....	538,386	508,683
Del., Lack. & Western..	985,035	906,203
Delaware & Hudson....	892,471	851,960
Pennsylvania	618,096	527,139
Erie	721,756	647,707
N. Y., Ont., & Western..	159,043	146,985
Lehigh & New England.	347,435	325,389
Totals	6,564,285	6,173,774

SOUTH DAKOTA

A. O. Ringsrud, president of the **South Dakota Board of Charities and Corrections** has been authorized to canvass for bids on coal for various state institutions. The state penal and charitable institutions used about 18,000 tons of lignite last year and expect to use about the same amount this year and a supplementary amount will be needed. The report of State Heating Engineer Radcliff recommended the use of lignite from the state mine at \$2.50 a ton at the mine for the majority of the institutions, supplemented by screenings. Iowa coal is found cheaper for the state hospital and Wyoming coal for the Custer sanitarium. The Redfield school uses lignite.

TENNESSEE

The Putnam Mining Co., of Cookeville, has been incorporated with a capital of \$50,000 and will develop a coal mine near Monterey. O. K. Holladay is president and H. S. Hargis is secretary and treasurer.

Nine barges of coal being towed on the Mississippi River by the steamer **Charles F. Richardson**, of the **West Kentucky Coal Co.** and destined to Vicksburg, Miss., are reported as having sunk when the cargo encountered a rain and wind storm a short distance north of Memphis, June 7. The estimated value of the barges and coal was given at \$60,000.

TEXAS

H. L. Mills, business manager of public schools, Houston, is in the market for 1,200

tons of lump coal to be distributed to various school houses.

A bill levying a 2 per cent tax on production of coal and lignite in Texas has been reported favorably by a Senate committee of the third called session of the Thirty-eighth Legislature now in session at Austin. The tax on lignite and coal mined in this state was added to the bill as it passed the House, a committee substitute levying the production tax of 2 per cent on eleven other articles. The House bill proposed only to levy the tax on sulphur and turpentine. It is declared that the proposed tax on coal and lignite will result in the death of the bill in the Senate.

UTAH

The Utah Railway is spending \$100,000 in Spring Canyon cementing two of its tunnels between **Hiawatha** and **Martin**. These tunnels have been giving considerable trouble.

The State Industrial Commission is investigating allegations made by two men that they were sent here by an Illinois employment agency and assured work in Utah coal mines only to find men were being turned away.

The Utah Central Coal Co. has been incorporated at Ogden with a capital of \$500,000 in shares of par value of \$100 each. M. S. Browning is president; E. S. Rolapp, vice-president; John Browning, secretary and treasurer. The company's property is in Carbon County.

A story comes from southern Utah about an Easterner named **Buckner**, who 40 years ago invested some of his small savings in a Utah coal mine, later coming West himself. The coal mine in a short time was regarded as a gold brick and forgotten. Last winter Buckner's feet were badly frozen and a few weeks ago his legs became infected and he died. Just before he died relatives announced that his coal stock had taken a jump and was worth \$50,000.

WEST VIRGINIA

The Searles Coal Co. has been organized by Charleston capitalists for the purpose of engaging in the coal business in the Kanawha field, with a capital stock of \$50,000. Principally interested in the new company are: S. W. Searles, E. E. Searles, F. W. Field, E. A. Field and R. W. Burton, all of Charleston.

The West Virginia-Great Lakes Coal Corporation has been organized with a capital stock of \$500,000 by some of those prominent in coal circles in northern West Virginia and with a view to producing and marketing northern West Virginia coal on a large scale, principally at piers on the Great Lakes. Fairmont is to be the general office of the company. Among those largely interested in this company are: James Edwin Gaskill, C. E. Gaskill, M. L. Gaskill, E. M. Hill and E. M. Watkins, all of Fairmont.

The Sterling Black Mining Co. has been incorporated with 1,000 shares of no-par value, the seat of operation to be at or near Altman, in Boone County. Among those interested in the new enterprise are G. W. Coyle, of Columbus, Ohio; Sam Brown, of Pittsburgh, Pa.; T. L. Johnson, Frank Kerns and I. F. Somerville, of Charleston.

The Morrison Coal Co. is engaged in opening a large mine for the purpose of operating on a large scale in Wyoming County, where this company has a large acreage under lease. At the present rate of construction progress, the company will be able to operate late in the year. The Morrison company is headed by John Laing, of Charleston.

The New River Co., the largest concern operating in the New River field, produced a total of 600,000 tons during the months of January, February, March and April, production for April amounting to 154,000 tons or about 20,000 tons less than for March. During the first four months of the year the New River company had declared \$4.50 a share in dividends, or \$330,546 in all on its 73,477 shares of preferred stock.

Extensive improvements are under way at the plants of the **Brady Warner Coal Corporation** at Brady, in Monongalia County, and at its Abrams Creek mine at Oakmont, in Mineral County. At Brady the company has built a wooden tippie with loading booms, has installed two rotary dumps, and has laid 65-lb. rail along the haulageway. The company has also purchased 100 new 4½-ton steel mine cars. When improvements are completed, the two

miners at Brady will have a capacity of 4,000 tons a day. At the Oakmont mine 65-lb. steel rails are being laid and a sub-station is being constructed. It is planned to equip the plant with a 24-ft. picking table, rotary dump and button conveyor, the latter being installed by the Fairmont Mining Machinery Co. At this plant also 100 new 34-ton steel mine cars have been added.

Construction work is under way on a tippie for the Brown No. 1 mine of the Fairmont-West Virginia Gas Coal Co. on the Wyatt branch of the Western Maryland Ry. in the Marion County field. Robert L. Brown and associates are largely interested in the company. The tippie will have a loading capacity of from 1,000 to 1,250 tons of coal a day. Construction work is progressing also on an adequate siding.

A fall of slate which loosened a trolley wire in the Jamison No. 7 mine of the Bethlehem Mines Corporation near Barrackville, in Marion County, on June 11 is thought to have been the indirect cause of a mine fire which baffled the efforts of fire fighters for the better part of a day and a half, though it did little damage. The mines resumed operations after the loss of only two or three days.

Under a decision of the West Virginia Supreme Court of Appeals handed down June 12 was held that miners at an operation where the "Washington agreement" of 1917, providing for increased wages and an increase in the fixed price of coal, was not in effect had no ground for claiming a share in any increased price of coal received by the operator after that agreement. The decision was in connection with a decree affirming the decision of the Circuit Court of McDowell County in the case of N. M. Brown and others against the Bottom Creek Coal & Coke Co. Brown and thirty-three other employees of the company sued that concern, alleging that after the Washington agreement in October, 1917, the company received an increase of 45c. a ton over the price fixed by the Coal Administrator in August, 1917, but that the miners received no increase in wages. The miners asked for an accounting of the tons of coal they had mined, the price received for it and distribution of what they claimed was a trust fund automatically created by reason of the increased price.

WASHINGTON

A miner was killed early in May by a fall of loose coal in the Hiawatha Coal Co.'s mine near Durham. The mine had been reopened after a shut-down of three years.

WISCONSIN

The Berwind Fuel Co. is completing a concrete floor on its Dock No. 1 at Superior. Screenings will be stored on the dock.

The B. F. Sturtevant Co., of Hyde Park, Mass., has purchased the plant of the Wisconsin Engine Co., at Corliss. The new acquisition covers nearly ten acres and the buildings have approximately 150,000 sq.ft. of floor space.

J. W. Gorby, of the Cyclone Fence Co., Waukegan, Ill., told the members of the Junior Association of Commerce at Milwaukee recently that Milwaukee and the entire lower basin of Lake Michigan is the center of the greatest deposits of coal and iron of the country.

William Wilshire, president; W. H. Gowin, vice-president, and J. T. Stonerod, of the Carnegie Dock & Coal Co., have made a tour of inspection of the company's properties at the Head-of-the-Lakes. They expressed themselves as well pleased with the outlook, and said that the prospective adjustment would settle the rate dispute now going on.

WASHINGTON, D. C.

Robert E. Quirk, who recently resigned as chief examiner of the Interstate Commerce Commission, has formed a partnership with J. VanDyke Norman and George F. Graham for the general practice of law. The firm name will be Norman, Quirk & Graham and will have offices in the Woodward Building, Washington, D. C., and the Inter-Southern Building, Louisville, Ky.

Two cases involving questions of evaluation of a public utility for rate-making purposes were decided by the U. S. Supreme Court June 11. In the case of the Bluefield Water Works & Improvement Co. against the Public Service Commission of West Virginia, the Court, in an opinion by Associate Justice Butler, held that the

rates fixed for water service at Bluefield were too low, and that under the facts presented the company was entitled to a return of more than 6 per cent. Associate Justice Brandeis agreed with the other members of the Court in reversing the state court, but noted the same position regarding replacement values that he took in the case of the Southwestern Telephone Co. against the Missouri Commission, decided the week previous. In the case of the Georgia Railway & Power Co. and the Atlanta Gas Light Co., its lessor, the Supreme Court, in an opinion read by Associate Justice Brandeis, affirmed the decree of the lower courts dismissing a suit against the Railroad Commission of Georgia to restrain reduced rates for Atlanta's gas supply. Associate Justice McKenna dissented from the majority opinion, holding that replacement value, as fixed in principle by the Court in the cases of the Southwestern Telephone Co. and the Bluefield Water Works & Improvement Co., had not been applied in this Georgia case. The majority opinion pointed out that in the Atlanta gas case, the Railroad Commission had carefully considered replacement value and increased costs, although it did not allow all the claims of the company in this regard; hence the case differed from the others cited as precedents.

The U. S. Civil Service Commission announces open competitive examinations for valuation engineer (\$3,600 to \$4,800 a year) and associate valuation engineer (\$3,000 to \$3,600 a year), oil and gas, coal mining and timber. Applications will be rated as received until Aug. 31. The examination is to fill vacancies in the technical staff of the income tax unit of the Bureau of Internal Revenue, Treasury Department, and in positions requiring similar qualifications. Full information and application blanks may be obtained from the U. S. Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil service examiners at the post office or custom house in any city.

CANADA

During the last two months there has been a heavy slump in the coal mining industry in British Columbia, particularly at the Vancouver Island collieries, the majority of which are working only half time. Coke production at the Crow's Nest mines has fallen off to a corresponding degree.

The floods in southern Alberta and southeastern British Columbia have done some damage to the coal mines and have completely disorganized the railways that serve them. The airshaft at the Galt mine has been caved in by floods and much water has entered the mine, and the tippie and screen at the Federal Coal Co.'s plant have been carried away. Traffic on the Canadian Pacific Crow's Nest Pass branch has been completely disorganized by washouts at Cowley and Michel, and for the time being is routed via the main line and the Kootenay central branch. Towns on the Crow's Nest Pass are being served by local trains that run between the washouts.

Canadian mines produced during February 1,611,800 net tons of coal, a decrease of 8 per cent from the output of January, which amounted to 1,745,700 tons. The February output was, however, 27 per cent greater than the previous three-year average for the month. The combined outputs from the mines of Nova Scotia, Saskatchewan, Alberta and British Columbia were 132,000 tons less than in January. The cumulative output from all mines for January and February amounted to 3,357,500 tons. This figure, against the three-year average for the period, showed a gain of 26 per cent. Importations of all coal during the month of February amounted to 1,326,200 tons, a decrease of 19 per cent from the January imports but 29 per cent above the three-year average for the month. Included in the February imports figure was 64,200 tons from Great Britain. Total importations of all coal for January and February was 2,967,900 tons, an increase of 37 per cent above the three-year average. The imports of anthracite during February were approximately 1,000 tons greater than in January and amounted to 422,550 tons, including 42,200 tons from Great Britain. These imports were 49 per cent greater than the three-year average for the month.

Decision to tie up every colliery in the Sydney Mines district and to halt all shipping of coal from the piers at North Sydney was reported at a meeting of miners June 14. The decision followed the dismissal of certain employees in the Florence Colliery. The strike was to begin June 15.

Coal production in British Columbia during April shows a marked falling off as

compared to March figures, the decline amounting to 65,246 tons. The weakness of the market is reflected in the output of each of the three chief coal fields of the province. At present there are no signs of improvement. All the Vancouver Island mines are working half time and the crews of most are being reduced. The only exception to this is the East Wellington Coal Co., operated by J. Grant, which is included among the producers for the first time and which mined 1,044 tons. The Canadian Collieries (D), Ltd., and the Western Fuel Corporation of Canada are the most affected in this field. The Crow's Nest of the Eastern Interior seems to be facing the necessity of slowing down also, as production there has dropped from 79,509 to 56,651 tons. The British Columbia April, 1923, output is shown in this report.

VANCOUVER ISLAND DISTRICT

	Tons
Granby C. M. S. & P. Co.	19,908
Nanoose-Wellington Collieries	5,489
East Wellington Coal Co.	1,044
King & Foster	572
Canadian Collieries	
Comox	24,017
Extension	14,162
S. Wellington	5,880
Western Fuel Co.	
No. 5 Mine	25,023
Reserve	11,111
Wakesiah	8,422
Total	115,628

NICOLA-PRINCETON DISTRICT

Middlesboro Collieries	7,664
Coalmont Collieries	9,401
Princeton Land & Coal Co.	1,210

Total 18,275

CROW'S NEST PASS DISTRICT

Crow's Nest Pass Coal Co. Ltd.	52,371
Corbin Coal & Coke Co.	4,280

Total 56,651
Total for province 190,554

Association Activities

Coal Operators' Association of Fifth and Ninth Districts of Illinois

The annual meeting and election of officers of the Coal Operators' Association of the Fifth and Ninth Districts of Illinois was held June 12 at the Missouri Athletic Association, St. Louis. After a light lunch the happenings of the past year effecting the coal industry were reviewed and discussed by the president, Dr. C. H. Krause, and the vice president, H. C. Perry. Both speakers cited the tendency in Illinois as well as some other districts to handicap the coal industry with legislation which would not only be a detriment to the coal industry itself but to other industries as well. Hope was expressed that the report of the U. S. Coal Commission soon to be made would prove to be a foundation around which constructive work in making of wage agreements might be carried on with resulting greater stability in the future than has been experienced in the past few years. The necessity of service as the foundation of true prosperity was emphasized. Officers re-elected for the ensuing year are: Dr. C. H. Krause, president; H. C. Perry, vice president; O. L. Lumaghi, secretary-treasurer.

Mine Inspectors' Institute of America

The Mine Inspectors' Institute of America will hold its annual meeting in Pittsburg, Kan., July 10, 11 and 12, 1923. Headquarters will be the Stilwell Hotel. The following are subjects to be discussed: (1) Electric machinery in gaseous mines, and its limitations for safety. (2) How to recognize a dusty mine, from the standpoint of danger. (3) Should the use of black blasting powder be prohibited in all bituminous mines? (4) What can be done to reduce accidents from falls of roof: (a) by additional legislation; (b) by the operator; (c) by the miner; (d) by the state inspector? (5) Is compensation and aid in reducing mine accidents? (6) What reduction in accidents has resulted from safety organizations conducted by the operator, and what are the main features of any that have proved a benefit? (7) Is it practicable to frame a basic mine law suitable for all bituminous mine conditions as a model for promotion of uniformity in state laws, as they relate to accident prevention and general safety? (8) In what manner can the Federal Bureau of Mines be of greatest assistance to the state mine inspectors? Discussion opened by Dr. J. J. Rutledge, Chief of the Bureau of Mines, Maryland.

Trade Literature

Steam Turbines for Power Distribution in a By-Product Coking Plant. De Laval Steam Turbine Co., Trenton, N. J. Four-page folder describing and illustrating installation of steam turbines in the by-products coke oven plant of the New England Fuel & Transportation Co. at Everett, Mass.

Centrifugal Pumps and Centrifugal Pumping Units. Allis-Chalmers Mfg. Co., Milwaukee, Wis., Bulletin No. 1632-F., Pp. 58; 8 x 10 in., illustrated; tables. On pages 28 and 34 are described pumps for the power plant and for unwatering and drainage purposes at the mines. Instructions for installation and operation of horizontal centrifugal pumps cover pages 50 to 55.

Combusco Ash Conveyor. Combustion Engineering Corporation, New York City. Pp. 11, 8 x 11 in., illustrated. Among the advantages claimed for this new apparatus are that it dispenses with manual labor, quenches the ashes as they fall from the furnace, prevents all dust, fumes and heat in the ash tunnel, maintains a perfect air seal in the combustion chamber, improves the efficiency of the boilers by preventing air leakage, removes the ashes and clinker from the furnace automatically and continuously and does not necessitate that the boilers be built above the ground level as the conveyor can be built in the setting.

Shoveloder. Lake Superior Loader Co., Duluth, Minn. Pp. 23; 8 x 11 in., illustrated. The shoveloder is shown at work excavating fire clay without blasting, loading rock brushed from the roof, etc. The savings from the use of this machine is given in a report from the superintendent of a coal company.

American Power Pumps. American Steam Pump Co., Battle Creek, Mich., Bulletin No. 18, Pp. 15, 6 x 9 in., illustrated. Describing the following power pumps: Duplex, geared, belted, gathering or dip pump and motor-driven pump.

A Handbook of Rock Drill Steel. Sullivan Machinery Co., Chicago, Ill., Circular No. 72-G, Pp. 79, 5 x 7 in., illustrated. This useful little book describes the selection, heating, forging and tempering of rock drill steel. Included also are instructions for the care and use of Sullivan drill sharpeners and drill steel furnaces.

Traffic News

The United Collieries, Inc., of St. Charles, Va., has filed a complaint against the Southern Ry. in the matter of car supply.

Complaints have been filed by numerous consumers in Atlanta against existing rates on coal from points in Kentucky and Tennessee.

The Chesapeake & Ohio Ry. has appointed A. M. Dudley general coal freight agent in charge of all coal and coke traffic, vice H. S. Smith, coal freight agent, who is appointed assistant general freight agent with offices at Richmond, Va. The change became effective June 1.

The Interstate Commerce Commission hearing set for June 18 to consider matters in connection with the case of Winding Gulf Colliery Co. versus the Chesapeake & Ohio Ry. has been postponed until July 9. Examiner W. H. Wagner will conduct the hearing in Washington on that date.

In the case of the Detroit Coal Exchange attacking rates applied on anthracite during a portion of 1918, the Interstate Commerce Commission has ruled that the rate applied by the carriers was unreasonable to the extent that it exceeded \$3.70 per gross ton. The commission has upheld the contention of the Utah Fuel Co. in regard to unreasonable rates on intra-plant switching service. Reparation has been awarded the Terre Haute Paper Co. because of unreasonable intrastate rates charged during federal control.

Thirty-five million dollars is the total expended in 1922 and authorized for 1923 for improvements by the Norfolk & Western Ry. Orders were given for 7,500 coal and freight cars, nearly all of which have been received and are in service. Forty-two heavy-type steam locomotives also were ordered and most of these have been delivered. Four of the big electric locomotives are due to be delivered this autumn. Large expenditures are under way for additional mainline track at a number of points where a third track is being installed, the object be-

ing to make the line a three-track line, at least, through the coal field and most of the way to Roanoke. To facilitate the western movement, the Auville yard is being considerably expanded. Double-track extension, involving considerable excavation, is being pushed rapidly from Bluestone to Ruth. This extension is leading up to one of the biggest improvements about to be started, a duplicate of the Coaldale tunnel over a mile in length to be driven as soon as the preparatory work is finished on the approaches to the Coaldale tunnel. Another big improvement under consideration is the probable double-tracking of a portion of the Big Sandy line of the Norfolk and Western. Although a great amount of construction work is observed from Bluestone east, including the third-track extension work at Shawsville, the greater portion of improvements have been contracted for west of Bluefield and west to Cincinnati and Columbus, where the volume of traffic of the road is growing rapidly.

The Coal and Coke Committee, Trunk Line Territory, announces hearings at 143 Liberty Street New York, commencing June 28, relative to adjustment of rates on coke from regions on Pennsylvania System and lateral connections to points on the New York, Ontario & Western Ry. and to New Berlin, N. Y., Unadilla Valley Ry.; from ovens on the Buffalo, Rochester & Pittsburgh Ry. to points on the New York, Ontario & Western Ry. on bituminous coal from mines on the Norfolk & Western Ry. to points on the Washington division of the Southern Ry. and from mines on originating lines to the Erie R.R., Barton to Owego, N. Y., inclusive; D. L. & W. R.R., Litchfield to Owego, N. Y., inclusive, and L. V. R.R., Hanna to Owego, N. Y., inclusive. The reasons for these proposals are to remove fourth section departures and to establish the same rates to the same rates the same or contiguous points on the Erie R.R. and the D. L. & W. R.R.

The New York, New Haven & Hartford R.R. had a deficit after all charges of \$4,865,767.92, says the annual report for 1922 of E. J. Pearson, president. This is attributed to the cut in freight rates, increase in the cost of fuel owing to the coal strike, increase in operating expenses owing to the shop-crafts strike, and congestion of traffic following the settlement of the coal strike, aggravated by unusual winter adversity. This company owns 291,622 shares, or 50.2 per cent, of the capital stock of the New York, Ontario & Western R.R., having a total value of \$13,108,397.62. Operating revenues for the year were \$123,246,640.64, an increase of \$6,841,407.77 over 1921. The revenue from freight increased \$6,337,747.34 or 11.83 per cent, while the freight carried showed an increase of 2,224,301 tons over 1921. The report shows that there was spent for fuel for yard locomotives \$2,006,344.60, an increase of \$186,590.37 over 1921, and for train locomotives \$9,224,123.80, a decrease of \$140,664.55 over 1921.

Rates on coal from the mines of the Commercial Coal Co., in the McRoberts group on the eastern Kentucky division of the Louisville & Nashville R.R. to Louisville, Cincinnati and other points west of the Illinois-Indiana line are not unreasonable, but are unduly prejudicial to the extent that they exceed the contemporaneous rates from the Hazard group, in the opinion of John McChord, an attorney examiner for the Interstate Commerce Commission. In his tentative opinion in this case he points out that the rate groups of this division are not of long standing and that the extensions of the Hazard group in recent years is convincing that they are in a state of evolution.

On June 1, according to the Car Service Division of the American Railway Association, railroads of the United States had 51,281 serviceable locomotives, which is the largest number on record for any time during the same period. This was an increase of 694 over the number of such locomotives on May 15 which had previously marked the peak. Locomotives in need of repair June 1 totaled 12,683, 19.9 per cent of the total number on line, which is the smallest number in need of repair for any time since the Car Service Division began the compilation of its locomotive records. The railroads repaired and turned out of their shops from May 15 to June 1 21,406 locomotives, the largest number for any semi-monthly period on record. The total number of locomotives in need of repair on June 1 was a decrease of 812 since May 15, at which time there were 13,495 or 21 per cent.

Three members of the Interstate Commerce Commission dissented from the majority opinion in the case of John Hawkins and Co., coal dealers of Nutley, N. J., against the Erie Railroad Co., involving a demurrage question. The shipments in-

involved in the case originated at Pennsylvania mines during October and November, 1919. They were stopped in transit, by orders from the U. S. Fuel Administration. The Hawkins track had a capacity of two cars. The cars, through no fault of the consignee, were bunched in transit and when delivered the coal was frozen. Immediately on their arrival, however, the consignee set about vigorously to thaw the coal and unload it. While all of the demurrage regulations were not complied with, the majority holds that the commission's powers "should not be construed so narrowly as to defeat justice." On that basis, the Hawkins Co. was awarded reparation in the full amount of the demurrage charges paid. Commissioner Hall, in a dissenting opinion, declares that "we have no jurisdiction to mitigate the seeming harshness of the law."

Coming Meetings

Oklahoma Coal Operators' Association will hold its annual meeting Sept. 13 at McAlester, Okla. Secretary, A. C. Casey, McAlester, Okla.

Rocky Mountain Coal Mining Institute will hold its summer meeting Aug. 27 to 29 at Salt Lake City, Utah, in conjunction with the **International Safety and First-Aid Meet.** Secretary, Benedict Shubart, Denver, Colo.

Iron and Steel Exposition at Buffalo, N. Y., Sept. 24-28. Association of Iron and Steel Electrical Engineers, Empire Building, Pittsburgh, Pa.

National Retail Coal Merchants' Association will hold its sixth annual convention June 25, 26 and 27 at Scranton, Pa., with headquarters at the Hotel Casey.

National Safety Council will hold its twelfth annual safety convention at the Buffalo Statler Hotel, Buffalo, N. Y., Oct. 1-5. Managing director and secretary, W. H. Cameron, 168 No. Michigan Ave., Chicago, Ill.

International First-Aid and Mine Rescue meet will be held Aug. 27-29, at Salt Lake City, Utah.

American Institute of Electrical Engineers will hold its annual convention June 25-29, at Swampscott, Mass. Secretary F. L. Hutchinson, 29 West 39th St., New York City.

American Society for Testing Materials will hold its annual meeting at the Chalfonte-Haddon Hall Hotel, Atlantic City, N. J., beginning June 25 and continuing throughout the week. Secretary, E. Marburg, Philadelphia, Pa.

The Colorado & New Mexico Coal Operators' Association will hold its annual meeting June 20 at Denver, Col. Secretary, F. O. Sandstrom, Denver, Col.

National Coal Association will hold its sixth annual convention June 19-22, at Atlantic City, N. J. Assistant secretary, C. C. Crowe, Washington, D. C.

The American Institute of Mining and Metallurgical Engineers has accepted the invitation extended by the Ministers of Mines of Ontario and Quebec and by the Canadian Institute of Mining and Metallurgy to hold its autumn meeting in Canada. The meeting will start Aug. 20 at Toronto and end Aug. 30 at Montreal. Secretary, F. F. Sharpless, 29 West 39th Street, New York City.

Coal Mining Institute of America will hold its annual meeting Dec. 19, 20 and 21 at Pittsburgh, Pa. Secretary, H. D. Mason, Jr., Chamber of Commerce Building, Pittsburgh, Pa.

The American Mining Congress will hold its twenty-sixth annual convention in conjunction with the **National Exposition of Mines and Mining Equipment.** Sept. 24-29, at the Milwaukee Auditorium, Milwaukee, Wis. Secretary, J. F. Callbreath, Washington, D. C.

Ninth National Exposition of Chemical Industries at the Grand Central Palace, New York City, week of Sept. 17. Manager, Charles F. Roth, Grand Central Palace, New York City.

West Virginia Coal Association will hold its annual meeting Tuesday afternoon, June 19, at Atlantic City, N. J. Secretary W. H. Cunningham, Huntington, W. Va.

Mine Inspectors' Institute of America will hold its 13th annual meeting July 10-12 at Pittsburgh, Kan. Secretary, J. W. Paul, 4800 Forbes St., Pittsburgh, Pa.

Ontario Mining Association will hold its annual meeting July 5 at Kirkland Lake, Ont., Can. Secretary, B. Nelly, Toronto, Ont., Can.